FORM AEC-374A
(2-65)

U. S. ATOMIC ENERGY COMMISSION
BYPRODUCT MATERIAL LICENSE
Supplementary Sheet

License Number 04-00487

Amendment No. 08

Department of the Navy
U. S. Naval Radiological
Defense Laboratory
San Francisco, California 94135

License Number 04-00487-08 is hereby terminated.

For the U. S. Atomic Energy Commission

Date SEP 22 1969

by Isotopes Branch
Division of Materials Licensing
Washington, D. C. 20545

FORM AEC-374A
(2-65)

U. S. ATOMIC ENERGY COMMISSION
BYPRODUCT MATERIAL LICENSE
Supplementary Sheet

License Number 04-00467-08

Amendment No. 04

Department of the Navy
U. S. Naval Radiological
Defense Laboratory
San Francisco, California
94135

Rec'd 11/3/67

License Number 04-00467-08 is amended as follows:

Condition 15. is amended to read:

15. Except as specifically provided otherwise by this license, the licensee shall possess and use byproduct material described in Items 6, 7, and 8 of this license in accordance with statements, representations, and procedures contained in application dated April 28, 1967, and document titled, "Maintenance Manual, Radiation Range, Camp Parks," dated August, 1967.

NOV 7 1967

Date

For the U. S. Atomic Energy Commission

by Isotopes Branch

Division of Materials Licensing
Washington, D. C. 20545

FORM AEC-374
(1-66)
10 CFR 30

U. S. ATOMIC ENERGY COMMISSION
BYPRODUCT MATERIAL LICENSE

License No. 04-00487-08
Page 1 of 3 Pages
Amendment No. 03

Pursuant to the Atomic Energy Act of 1954 and Title 10, Code of Federal Regulations, Chapter 1, Parts 30, 32, 33, 34, and 35, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, own, possess, transfer and import byproduct material listed below; and to use such byproduct material for the purpose(s) and at the place(s) designated below. This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, and is subject to all applicable rules, regulations, and orders of the Atomic Energy Commission now or hereafter in effect and to any conditions specified below.

Licensee

1. Name: Department of the Navy
2. Address: U. S. Naval Radiological Defense Laboratory, San Francisco, California 94135

In accordance with application dated April 28, 1967,

3. License number 04-00487-08 is amended in its entirety to read as follows:
4. Expiration date: May 31, 1972
5. Reference No.

[illegible] 5/18/[illegible]

6. Byproduct material (element and mass number)	7. Chemical and/or physical form	8. Maximum amount of radioactivity which licensee may possess at any one time
A. Cobalt 60	A. General Electric Company Doubly Encapsulated Sealed Sources	A. 15,000 curies contained in 5 sources of 3,000 curies each

9. Authorized use

A. For use in high intensity large area gamma radiation field.

CONDITIONS

10. Byproduct material may only be used at Camp Parks, California.

11. The licensee shall comply with the provisions of Title 10, Part 20, Code of Federal Regulations, Chapter 1, "Standards for Protection Against Radiation." In lieu of the control device requirements of Section 20.203(c)(2), 10 CFR 20, the entrances to high radiation areas must be locked so as to make the area inaccessible at all times when a radiation level exists therein which could cause an individual to receive a dose in excess of 100 millirem in one hour.

(Continued) CONDITIONS

12. Pursuant to Section 20.105(a), 10 CFR 20, radiation levels in unrestricted areas in excess of the limits specified in Section 20.105(b), 10 CFR 20, as specified in "Rad Safe Aspects of the Camp Parks Radiation Range," revised 6/66, are hereby authorized.

13. Byproduct material shall be used by, or under the supervision of, individuals designated by the U. S. Naval Radiological Defense Laboratory Radiological Safety Committee.

14. A. Each sealed source containing byproduct material, other than Hydrogen 3, with a half-life greater than thirty days and in any form other than gas shall be tested for leakage and/or contamination at intervals not to exceed six months. In the absence of a certificate from a transferor indicating that a test has been made within six months prior to the transfer, the sealed source shall not be put into use until tested.

B. The test shall be capable of detecting the presence of 0.05 microcurie of radioactive material on the test sample. The test sample shall be taken from the sealed source or from the surfaces of the device in which the sealed source is permanently mounted or stored on which one might expect contamination to accumulate. Records of leak test results shall be kept in units of microcuries and maintained for inspection by the Commission.

C. If the test reveals the presence of 0.05 microcurie or more of removable contamination, the licensee shall immediately withdraw the sealed source from use and shall cause it to be decontaminated and repaired or to be disposed of in accordance with Commission regulations. A report shall be filed within 5 days of the test with the Director, Division of Materials Licensing, U. S. Atomic Energy Commission, Washington, D. C. 20545, describing the equipment involved, the test results, and the corrective action taken. A copy of such report shall be sent to the Director, Region V, Division of Compliance, USAEC, 2111 Bancroft Way, Berkeley, California 94704.

14. (Continued) CONDITIONS

D. Tests for leakage and/or contamination shall be performed in accordance with procedures in the application dated April 28, 1967, or by other persons specifically authorized by the Commission or an Agreement State to perform such services.

15. Except as specifically provided otherwise by this license, the licensee shall possess and use byproduct material described in Items 6, 7, and 8 of this license in accordance with statements, representations, and procedures contained in application dated April 28, 1967.

For the U. S. Atomic Energy Commission

MAY 17 1967

Date _____

by Isotopes Branch
Division of Materials Licensing
Washington, D. C. 20545

FORM AEC-374A
(12-57)

U.S. ATOMIC ENERGY COMMISSION

BYPRODUCT MATERIAL LICENSE

Supplementary Sheet

CORRECTED COPY

License Number 4-487-8
(E67)

AMENDMENT NO. 2

Department of the Navy
U. S. Naval Radiological Defense
Laboratory
San Francisco, California

Mailed to NRDL by Stamp Ltd. on 7/26/65. Rec'd. this corrected copy on 7/27/65 (1st copy was #487-4 in error).

License No. 4-487-8 is amended as follows:

Condition 14. is amended to read:

14. A. Each sealed source containing byproduct material, other than Hydrogen 3, with a half-life greater than thirty days and in any form other than gas shall be tested for leakage and/or contamination at intervals not to exceed six months. In the absence of a certificate from a transferor indicating that a test has been made within six months prior to the transfer, the sealed source shall not be put into use until tested.

B. The test shall be capable of detecting the presence of 0.05 microcurie of radioactive material on the test sample. The test sample shall be taken from the sealed source or from the surfaces of the device in which the sealed source is permanently mounted or stored on which one might expect contamination to accumulate. Records of leak test results shall be kept in units of microcuries and maintained for inspection by the Commission.

C. If the test reveals the presence of 0.05 microcurie or more of removable contamination, the licensee shall immediately withdraw the sealed source from use and shall cause it to be decontaminated and repaired or to be disposed of in accordance with Commission regulations. A report shall be filed within 5 days of the test with the Director, Division of Materials Licensing, U. S. Atomic Energy Commission, Washington, D. C. 20545, describing the equipment involved, the test results, and the corrective action taken. A copy of such report shall also be sent to the Director, Region V, Division of Compliance, USAEC, 2111 Bancroft Way, Berkeley, California 94704.

D. Tests for leakage and/or contamination shall be performed in accordance with procedures in the application dated April 30, 1965, or by other persons specifically authorized by the Commission or an Agreement State to perform such services.

For the U. S. Atomic Energy Commission

Date JUL 12 1965

by _____
Isotopes Branch
Division of Materials Licensing
Washington, D. C. 20545

FORM AEC-374
(12-57)

U. S. ATOMIC ENERGY COMMISSION
BYPRODUCT MATERIAL LICENSE

4-407-6 (867) AMENDMENT NO. 1

Pursuant to the Atomic Energy Act of 1954 and Title 10, Code of Federal Regulations, Chapter 1, Part 30, Licensing of Byproduct Material, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, own, possess, transfer and import byproduct material listed below, and to use such byproduct material for the purpose(s) and at the place(s) designated below. This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, and is subject to all applicable rules, regulations, and orders of the Atomic Energy Commission now or hereafter in effect and to any conditions specified below. Orig. Mailed To NRCL on 5/23/65-6926-538

Licensee	
1. Name	Department of the Navy
2. Address	U. S. Naval Radiological Defense Laboratory San Francisco, California

In accordance with application dated April 30, 1965,

3. License number 4-407-6 is amended in its entirety to read as follows:

4. Expiration date May 31, 1967

5. Reference No.

6. Byproduct material (element and mass number)	7. Chemical and/or physical form	8. Maximum amount of radioactivity which licensee may possess at any one time
a. Cobalt 60	a. General Electric Company Doubly Encapsulated Sealed Sources	a. 15000 curies contained in 5 sources of 3000 curies each

9. Authorized use

a. For use in high intensity large area gamma radiation field.

CONDITIONS

10. Unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above:

11. Byproduct material shall be used only at Camp Parks, California.

12. The licensee shall comply with the provisions of Title 10, Part 20, Code of Federal Regulations, Chapter 1, "Standards for Protection Against Radiation." In lieu of the control device requirements of Section 20.203(c)(2), 10 CFR 20, the entrances to high radiation areas must be locked so as to make the area inaccessible at all times when a radiation level exists therein which could cause an individual to receive a dose in excess of 100 millirem in one hour.

13. Pursuant to Section 20.105(a), 10 CFR 20, radiation levels in unrestricted areas in excess of the limits specified in Section 20.105(b), 10 CFR 20, as specified in "Rad Safe Aspects of the Camp Parks Co-60 Facility" revised 4/65, are hereby authorized.

(See page 2)

License Number 4-457-3
(367)

Conditions continued: AMENDMENT NO. 1

14. A. Each sealed source containing byproduct material, other than Hydrogen 3, with a half-life greater than thirty days and in any form other than gas shall be tested for leakage and/or contamination at intervals not to exceed six months. In the absence of a certificate from a transferor indicating that a test has been made within six months prior to the transfer, the sealed source shall not be put into use until tested.

B. The test shall be capable of detecting the presence of 0.005 microcuria of radioactive material on the test sample. The test sample shall be taken from the sealed source or from the surfaces of the device in which the sealed source is permanently mounted or stored on which one might expect contamination to accumulate. Records of leak test results shall be kept in units of microcuries and maintained for inspection by the Commission.

C. If the test reveals the presence of 0.005 microcuria or more of removable contamination, the licensee shall immediately withdraw the sealed source from use and shall cause it to be decontaminated and repaired or to be disposed of in accordance with Commission regulations. A report shall be filed within 5 days of the test with the Director, Division of Materials Licensing, U. S. Atomic Energy Commission, Washington, D. C. 20545, describing the equipment involved, the test results, and the corrective action taken. A copy of such report shall also be sent to the Director, Region I, Division of Compliance, USAEC, 376 Hudson Street, New York, New York 10014.

D. Tests for leakage and/or contamination shall be performed by accordance with procedures in the application dated April 30, 1965, or by other persons specifically authorized by the Commission or an Agreement State to perform such services.

15. Except as specifically provided otherwise by this license, the licensee shall possess and use byproduct material described in Items 6, 7, and 8 of this license in accordance with statements, representations, and procedures contained in application dated April 30, 1965.

MAY 28 1965

Date

For the U. S. Atomic Energy Commission
Original Signed by
Ben Bassin

by Isotopes Branch
Division of Materials Licensing
Washington, D. C. 20545

5

FORM AEC-374
(12-57)

U. S. ATOMIC ENERGY COMMISSION
BYPRODUCT MATERIAL LICENSE

Pursuant to the Atomic Energy Act of 1954 and Title 10, Code of Federal Regulations, Chapter 1, Part 30, Licensing of Byproduct Material, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, own, possess, transfer and import byproduct material listed below; and to use such byproduct material for the purpose(s) and at the place(s) designated below. This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, and is subject to all applicable rules, regulations, and orders of the Atomic Energy Commission now or hereafter in effect and to any conditions specified below.

Licensee

1. Name: Department of the Navy
2. Address: U. S. Naval Radiological Defense Laboratory, San Francisco 24, California

3. License number: [illegible]
4. Expiration date: Jan 31 19[illegible]
5. Reference No.

6. Byproduct material (element and mass number)	7. Chemical and/or physical form	8. Maximum amount of radioactivity which licensee may possess at any one time
A. Cobalt 60	A. Doubly Encapsulated Cobalt 60 Sealed Sources	A. [illegible] curies contained in [illegible] sources of 1000 curies each

9. Authorized use

A. For use in High Intensity Large Area Gamma Radiation Field.

CONDITIONS

10. Unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above.

11. Byproduct material shall only be used at Camp Parks, California.

12. The licensee shall comply with the provisions of Title 10, Part 20, Code of Federal Regulations, Chapter 1, "Standards For Protection Against Radiation". In lieu of the control device requirements of Section 20.203(c)(2) of 10 CFR 20, the entrances to the high radiation must be locked so as to make the area inaccessible at all times when a radiation level exists therein which could cause an individual to receive a dose in excess of 100 millirem in one hour.

13. Pursuant to Section 20.105(a), 10 CFR 20, radiation levels in unrestricted areas in excess of the limits specified in Section 20.105(b), 10 CFR 20, as specified in Enclosure (1) to memorandum dated April 22, 1963, are authorized.

(See page 2)

Conditions continued

4.A. Each sealed source containing byproduct material, other than Hydrogen 3, with a half-life greater than thirty days and in any form other than gas shall be tested for leakage and/or contamination at intervals not to exceed six months. In the absence of a certificate from a transferor indicating that a test has been made six months prior to the transfer, the sealed source shall not be put into use until tested.

B. The test shall be capable of detecting the presence of 0.05 microcurie of radioactive material on the test sample. The test sample shall be taken from the sealed source or from the surfaces of the device in which the sealed source is permanently mounted or stored on which one might expect contamination to accumulate. Records of leak test results shall be kept in units of microcuries and maintained for inspection by the Commission.

C. If the test reveals the presence of 0.05 microcurie or more of removable contamination, the licensee shall immediately withdraw the sealed source from use and shall cause it to be decontaminated and repaired or to be disposed of in accordance with Commission regulations. A report shall be filed within five days of the test with the Director, Division of Licensing and Regulation, U.S. Atomic Energy Commission, Washington 25, D. C., describing the equipment involved, the test results and the corrective action taken. A copy of such report shall also be sent to the Director, Region V, Division of Compliance, USAEC, 2111 Bancroft Way, Berkeley 4, California.

D. Tests for leakage and/or contamination shall be performed by the licensee in accordance with procedures in Enclosure (1) to memorandum dated April 22, 1963.

5. Except as specifically provided otherwise by this license, the licensee shall possess and use byproduct material described in Items 6, 7 and 8 of this license in accordance with statements, representations and procedures contained in memorandum dated April 22, 1963, and enclosures thereto.

6. Written operating and emergency instructions with a content as specified or similar to those submitted as enclosures to the memorandum dated April 22, 1963, shall be distributed to personnel who will use or supervise use of the sources.

For the U. S. Atomic Energy Commission

Original Signed by
Richard E. Cunningham

by Isotopes Branch
Division of Licensing and Regulation
Washington 25, D. C.

9900
Ser 187 - 0516
12 September 1969

FIRST ENDORSEMENT ON NRDL LETTER 730-564 ALS:jhj OF 5 SEPTEMBER 1969

From: Commander, Naval Electronic Systems Command
To: Chief, Isotopes Branch
Division of Materials Licensing
U. S. Atomic Energy Commission
Washington, D. C. 20545

Subj: AEC Byproduct Material License No. 04-00487-08

Ref: (a) FONECON between Mr. Mahaffey, NAVELEX and Mr. A. Smith, NRDL on 11 September 1969

1. Basic letter contains a request to terminate subject license.

2. A review of the material indicates:

a. The Cobalt-60 sources of 3,000 curies each were transferred to License No. 04-01043-11 held by Stanford Research Institute.

b. A status report on material used at Camp Parks which was authorized under NRDL's License No. 04-00487-03.

3. The clearance levels followed during the referenced release status were discussed during the telephone conversation, reference (a), and included.

Beta-Gamma	0.2 mrad/hr at 1 cm	- fixed
	1000 dpm/100 cm^2	- removable
Alpha	500 dpm/100 cm^2	- fixed
	100 dpm/100 cm^2	- removable

M. G. WILLIAMS
By direction

Copy to:
BUMED(Code 74)
NRDL, SFRAN

MAHAFFEY/mitchell
61457 - 9/12/69
Serial 0909=018-69

U. S. NAVAL RADIOLOGICAL DEFENSE LABORATORY
SAN FRANCISCO, CALIFORNIA 94135

IN REPLY REFER TO:
730-564
ALS:jhj
5 Sept 1969

From: Commanding Officer
To: Director, Division of Materials Licensing,
U.S. Atomic Energy Commission, Washington, D.C. 20545

Via: Commander, Naval Electronic Systems Command, (Code 05163),
Munitions Bldg., 18th and Constitution Aves., Washington, D.C.
20390

Subj: License Status at Camp Parks

1. All licensed materials used at NRDL's field station at Camp Parks have been either removed or transferred to other licensed activities.

2. The Camp Parks Cobalt-60 Range has been transferred to AEC Byproduct Material License No. 04-01043-11 held by Stanford Research Institute, (SRI) Menlo Park, Calif. Therefore, it is requested that NRDL's Byproduct Material License No. 04-00487-08 covering the Range material, be canceled.

3. Under NRDL's BPM License 04-00487-03, licensed material was used in Camp Parks buildings 131, 305, 310, 311, 312, 331, and areas known as the Camp Parks Pond, the SRI Compound, and the Surface Roughness Area. Licensed material was removed from Bldg 131 except that for which SRI was licensed under BPM-04-01043-10. These remaining materials and the building have been transferred to SRI. Bldg 305 with its licensed material has been transferred to AEC BPM License No. 04-650-07, held by the University of California, Berkeley, California. The remaining buildings and areas have had all licensed materials removed and have been released from a controlled status. The release status has been verified by a representative from Region V Division of Compliance, US AEC.

W.E. CAMPBELL, JR
By direction

cc: W. Bordon, SRI
L. Hughes, U. of California
DCSR, Burlingame, California
OCD, Washington
NAVMAT (MAT 0331)

ACTION: 0552
INFO:
FILE NO: 2900
CON. NO: 018-04

9900
Ser 165 - 0516

JUL 5 1968

FIRST ENDORSEMENT ON NRDL LETTER SER 730-402 ALS:kmm OF 25 JUNE 1968

From: Commander, Naval Electronic Systems Command
To: Director
Division of Materials Licensing
U. S. Atomic Energy Commission
Washington, D. C. 20545

Subj: Leaking Cobalt-60 Source; Report Of

1. Basic letter contains a status report on subject source which had been used as the Tower Source in the Laboratory's Camp Parks Radiation Range.

2. This is one of the 3,000 curie sealed sourced of Cobalt-60 authorized under AEC Byproduct Material License No. 04-00487-08. The leaking source has been withdrawn from use and pertinent information relevant to this source includes: decontamination, wipe test results, removal in its cask from the range area, and storage pending pickup and disposal by an authorized licensed disposal activity.

Copy to:
BUMED(Code 74)
NRDL, SFRAN

M. G. WILLIAMS
By direction

MAHAFFEY/mitchell
61457 - 7/5/68
Serial 0628-009-68

ELEX-0516
9900
Ser 330
20 OCT 1967

FIRST ENDORSEMENT ON USNRDL LETTER 730-162 WGN/TRB:KMM OF 13 OCT 1967

From: Commander, Naval Electronic Systems Command
To: Chief, Isotopes Branch
Division of Materials Licensing
U. S. Atomic Energy Commission
Washington, D. C. 20545

Subj: AEC Byproduct Material License No. 04-00487-06

1. Basic letter with enclosure contains a revised manual for the Camp Parks Radiation Facility using large Cobalt-60 sealed sources authorized under subject license.

2. This material has been reviewed and the manual dated August 1967 completes the documentation in preparation by the Laboratory at the time the application of 26 April 1967, was submitted for renewal of AEC License No. 04-00487-06.

Copy to:
BUMED(Code 74)
NRDL, SFRAN

M. G. WILLIAMS
By direction

MAHAFFEY/mitchell
61457 - 10/20/67
Serial 671016-1961

U. S. NAVAL RADIOLOGICAL DEFENSE LABORATORY
SAN FRANCISCO, CALIFORNIA 94135

IN REPLY REFER TO:

730-162
WGN/TRB:kmm
13 OCT 1967

From: Commanding Officer and Director
To: U. S. Atomic Energy Commission (Division of Materials Licensing) 4915 Saint Elmo Avenue, Bethesda, Maryland 20014
Via: Commander, Naval Electronics Systems Command, (Code 05163), Munitions Building, 18th & Constitution Avenues, Washington, D. C. 20390

Subj: Engineer's Radiation Facility Manual; forwarding of

Ref: (a) CO&Dir ltr 730-95 DCC/ALS:ap of 1 May 1967

Encl: (1) Maintenance Manual Radiation Range, Camp Parks, August 1967 (4 copies)

1. At the time of the Byproduct Material License No. 04-00487-08 renewal application for our kilocurie Cobalt-60 Radiation Facility at Camp Parks, California, it was indicated in the correspondence accompanying reference (a) that the Engineer's Manual for this Facility was under revision and would be forwarded when completed.

2. Accordingly, submitted herewith as enclosure (1) is the revised Manual for your records and use.

T. R. BIRDWELL
By direction

ELEX-0516
2200
Ser 512
25 SEP 1967

FIRST ENDORSEMENT ON USNRDL LETTER 730-133 AK:kmm OF 19 SEP 1967

From: Commander, Naval Electronic Systems Command
To: Chief, Isotopes Branch
Division of Materials Licensing
U. S. Atomic Energy Commission
Washington, D. C. 20545

Subj: NSC Byproduct Material License Nos. 04-00487-03 and 04-00487-08

1. Basic letter with enclosures contain updated material relevant to the Radiological Safety Committee at the NRDL (Naval Radiological Defense Laboratory).

2. A recent change in staffing at NRDL has made it necessary to make a change in the membership of the Radiological Safety Committee. Members and qualifications of the committee are covered in the enclosures to the Laboratory's letter. The enclosures are replacement sheets for material previously submitted with applications for renewal of subject licenses.

Copy to:
BUMED(Code 74)
NRDL, SFBAY

C. S. HOLLANDER
By direction

MAHAFFEY/mitchell
61457 - 9/25/67
Serial 670922-0420

U. S. NAVAL RADIOLOGICAL DEFENSE LABORATORY
SAN FRANCISCO, CALIFORNIA 94135

IN REPLY REFER TO:
730-138
AK:kmm

19 SEP 1967

Rec'd: 9/22/67 - Forwarded by end #1) Ltr 0516 — 372) 25 Sep. 1967

AIRMAIL

From: Commanding Officer and Director
To: Chief, Isotopes Branch, Division of Materials Licensing, U.S. Atomic Energy Commission, Washington, D.C. 20545
Via: Commander, Naval Electronic Systems Command (Code 05163), Munitions Building, 18th & Constitution Avenues, Washington, D. C. 20390

Subj: Modification of U.S. Naval Radiological Defense Laboratory's (NRDL) Applications for Byproduct Material License Numbers 04-00487-03 and 04-00487-08

Ref: (a) NRDL ltr 730-57 DCC/ALS:kmm dtd 15 Dec 1966
(b) NRDL ltr 730-95 DCC/ALS:ap dtd 1 May 1967

Encl: (1) Supplement 2 (Item 5) Radiological Safety Committee Members and Qualifications (two (2) copies)
(2) Supplement 1 (Items 5, 8 and 9) Radiological Safety Committee Members and Qualifications (two (2) copies)

1. As a result of a recent change in staffing at NRDL, it is necessary to make a change in the membership of the Radiological Safety Committee. Dr. Myron I. Varon, CDR, MC, USN has been replaced by Dr. Thomas R. Birdwell, LCDR, MC, USN as an alternate chairman.

2. It is requested that enclosure (1) replace Supplement 2 (Item 5) (page 2) as submitted in reference (a) and that enclosure (2) replace Supplement 1 (Items 5, 8 and 9) (page 1) as submitted in reference (b).

T. R. BIRDWELL
By direction

SUPPLEMENT 2 (Item 5)

Radiological Safety Committee Members and Qualifications

Dr. Edward R. Tompkins, Chairman

Chairman, Radiological Safety Committee, NRDL, November 1962 to date; Associate Scientific Director, NRDL, November 1961 to date; Scientific Liaison Officer, ONR, London, England, July 1960-October 1961; Head, Chemical Technology Division, NRDL, December 1951-June 1960; Consultant, NRDL, five (5) months-1951; Consultant, U.C. Radiation Laboratory, Berkeley, California-16 months; Assistant Manager and Director of Research for Scientific Service, Inc., Berkeley, California-18 months; Radiochemist, AEC, Advisory Field Service, Oak Ridge, Tennessee-six (6) months; Supervisor, Chemistry Department, Clinton Laboratory, Oak Ridge, Tennessee-four (4) years; Research Chemist, Armour Research Foundation, Chicago, Illinois, one (1) year.

Albert L. Smith, Alternate Chairman

Head, Health Physics Division, NRDL, February 1962 to date; Head, Radiological Safety Branch, Health Physics Division, NRDL, July 1956-February 1962; Health Physicist, NRDL, October 1951-July 1956; Health Physicist, General Electric Corporation, Hanford Atomic Products Operation, January 1948-October 1951.

Dr. Thomas R. Birdwell, LCDR, MC, USN, Alternate Chairman

Head, Medical Department, NRDL, July 1967 to date. Research Pathologist, Biological and Medical Sciences Division, NRDL, 1966-1967; Pathology Resident, Department of Pathology, U.S. Naval Hospital, San Diego, California, 1962-1966; Internship, U.S. Naval Hospital, Camp Pendleton, California, 1961-1962; M.D., Tulane University Medical School, 1961.

Dr. Edward L. Alpen

Head, Biological and Medical Sciences Division, NRDL, April 1959 to date; Head, Biophysics Branch, NRDL, 1956-April 1959; Head, Thermal Injury Branch, NRDL 1952-1956; Investigator in Thermal Injury Branch, NRDL, April 1951-September 1952; Assistant Professor Pharmacology, George Washington University, Washington, D.C., January 1950-April 1951.

SUPPLEMENT 1 (Items 5, 8 and 9)

Radiological Safety Committee Members and Qualifications

Dr. Edward R. Tompkins, Chairman

Chairman, Radiological Safety Committee, NRDL, November 1962 to date; Associate Scientific Director, NRDL, November 1961 to date; Scientific Liaison Officer, ONR, London, England, July 1960-October 1961; Head, Chemical Technology Division, NRDL, December 1951-June 1960; Consultant, NRDL, five (5) months-1951; Consultant, U.C. Radiation Laboratory, Berkeley, California-16 months; Assistant Manager and Director of Research for Scientific Service, Inc., Berkeley, California-18 months; Radiochemist, AEC, Advisory Field Service, Oak Ridge, Tennessee-six (6) months; Supervisor, Chemistry Department, Clinton Laboratory, Oak Ridge, Tennessee-four (4) years; Research Chemist, Armour Research Foundation, Chicago, Illinois, one (1) year.

Albert L. Smith, Alternate Chairman

Head, Health Physics Division, NRDL, February 1962 to date; Head, Radiological Safety Branch, Health Physics Division, NRDL, July 1956-February 1962; Health Physicist, NRDL, October 1951-July 1956; Health Physicist, General Electric Corporation, Hanford Atomic Products Operation, January 1948-October 1951.

Dr. Thomas R. Birdwell, LCDR, MC, USN, Alternate Chairman

Head, Medical Department, NRDL, July 1967 to date. Research Pathologist, Biological and Medical Sciences Division, NRDL, 1966-1967; Pathology Resident, Department of Pathology, U. S. Naval Hospital, San Diego, California, 1962-1966; Internship, U. S. Naval Hospital, Camp Pendleton, California, 1961-1962; M.D., Tulane University Medical School 1961.

Dr. Edward L. Alpen

Head, Biological and Medical Sciences Division, NRDL, April 1959 to date; Head, Biophysics Branch, NRDL, 1956-April 1959; Head, Thermal Injury Branch, NRDL 1952-1956; Investigator in Thermal Injury Branch, NRDL, April 1951-September 1952; Assistant Professor Pharmacology, George Washington University, Washington, D. C., January 1950-April 1951.

ELEX-0516
9900
Ser 145
8 May 1967

FIRST ENDORSEMENT ON USNRDL LETTER 730-95 DCC/ALS: ap OF 1 MAY 1967

From: Commander, Naval Electronic Systems Command
To: Chief, Isotopes Branch
Division of Materials Licensing
U. S. Atomic Energy Commission
Washington, D. C. 20545

Subj: AEC Byproduct Material License No. 04-00487-08

1. Basic letter with enclosure contain and application for renewal of subject license.

2. This material has been reviewed and covers the completed AEC-Form-313 with referenced information attached thereto. The supplemental sheets include updated drawings and detailed information relevant to the radiological safety aspects of the large sealed sources of Cobalt-60 used at the Laboratory's Camp Parks Radiation Facility.

Copy to:
BUMED(Code 74)
USNRDL, SFRAN

M. G. WILLIAMS
By direction

MAHAFFEY/mitchell
61457 - 5/8/67
Serial none

U. S. NAVAL RADIOLOGICAL DEFENSE LABORATORY
SAN FRANCISCO, CALIFORNIA 94135

IN REPLY REFER TO:
730-95
DCC/ALS:ap

1 MAY 1967

From: Commanding Officer and Director
To: U.S. Atomic Energy Commission (Division of Materials Licensing) 4915 Saint Elmo Avenue, Bethesda, Maryland
Via: Commander, Naval Electronics Systems Command
Code 05163, Munitions Bldg.
Washington, D. C. 20360

Rec'd: 5/4/67 & forwarded by encl 1 — AEC 9516 45 by E May 1967.

Subj: Renewal application of By-product Material License No. 4-487-8; request for

Ref: (a) AEC Ltr. DML:IB:37 of 3 Apr 1967
(b) USNRDL Ltr. 730-35, ALS:jp of 30 Apr 1965

Encl: (1) AEC Form 313 w/supplements (3 copies)

1. As requested by Reference (a), Enclosure (1) is submitted for the renewal of NRDL's By-product Material License No. 4-487-8 for the Radiation Facility, Camp Parks, California.

2. The application for renewal encompasses the four track sources and the tower source. The latter has been temporarily withdrawn from use due to a minor leakage problem, but it is expected this will be corrected and its use resumed. The present amount of radioactive material of these sources is 8250 curies. It is anticipated that in the near future their radioactive strength will be restored to the original 15,000 curies.

3. The Radiation Facility has been employed without serious mishaps to operators or adjacent groups. Minor incidents have occurred, but the possibility of reoccurrence has been minimized by implementing a more intensive training program, periodic review sessions, and installation of additional safety features. Supplement (4) to Enclosure (1) has been corrected to show these added features. Where there has been no changes or additions made, the enclosures submitted with Reference (b) are still applicable. A new Engineering Manual is being prepared and a copy will be forwarded when it is ready.

4. It is requested that the two exceptions to Section 20.203(c)(2) and 20.105(b) 10 CFR 20, as stated in conditions 12 and 13 of the existing license be continued as well as the amended Condition 14 relative to leak test levels.

D. C. CAMPBELL

Copy to: (w/encl (1))
Region V, Div of Compliance, USAEC
2111 Bancroft Way, Berkeley, California 94704

Form AEC-313
8-64
10 CFR 30

UNITED STATES ATOMIC ENERGY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE

Form approved.
Budget Bureau No. 38-R027

INSTRUCTIONS. – Complete Items 1 through 16 if this is an initial application or an application for renewal of a license. Information contained in previous applications filed with the Commisson with respect to Items 8 through 15 may be incorporated by reference provided *references are clear and specific.* Use supplemental sheets where necessary. Item 16 must be completed on all applications. Mail two copies to: U.S. Atomic Energy Commission, Washington, D.C., 20545, Attention: Isotopes Branch, Division of Materials Licensing. Upon approval of this application, the applicant will receive an AEC Byproduct Material License. An AEC Byproduct Material License is issued in accordance with the general requirements contained in Title 10, Code of Federal Regulations, Part 30, and the Licensee is subject to Title 10, Code of Federal Regulations, Part 20.

1. (a) NAME AND STREET ADDRESS OF APPLICANT. *(Institution, firm, hospital, person, etc. Include ZIP Code.)*

U. S. Naval Radiological Defense Laboratory
San Francisco Bay Naval Shipyard
San Francisco, Calif. 94135

(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED. *(If different from 1 (a). Include ZIP Code.)*

Camp Parks, California

2. DEPARTMENT TO USE BYPRODUCT MATERIAL

Any

3. PREVIOUS LICENSE NUMBER(S). *(If this is an application for renewal of a license, please indicate and give number.)*

Renewal of 4-487-8

4. INDIVIDUAL USER(S). *(Name and title of individual(s) who will use or directly supervise use of byproduct material. Give training and experience in Items 8 and 9.)*

As approved by the U.S. Naval Radiological Defense Laboratory
Radiological Safety Committee

5. RADIATION PROTECTION OFFICER *(Name of person designated as radiation protection officer if other than individual user. Attach resume of his training and experience as in Items 8 and 9.)*

Supplement (1)

6. (a) BYPRODUCT MATERIAL. *(Elements and mass number of each.)*

Co^{60}

(b) CHEMICAL AND/OR PHYSICAL FORM AND MAXIMUM NUMBER OF MILLICURIES OF EACH CHEMICAL AND/OR PHYSICAL FORM THAT YOU WILL POSSESS AT ANY ONE TIME. *(If sealed source(s), also state name of manufacturer, model number, number of sources and maximum activity per source.)*

Five sealed sources, 3000 curies each
Manufactured by:
General Electric Co.
Vallecitos Atomic Laboratory
P.O. Box 846
Pleasanton, Calif. 94566

7. DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED. *(If byproduct material is for "human use," supplement A (Form AEC-313a) must be completed in lieu of this item. If byproduct material is in the form of a sealed source, include the make and model number of the storage container and/or device in which the source will be stored and/or used.)*

The U. S. Naval Radiological Defense Laboratory is engaged in basic and applied research on the physical, chemical and biological effects of nuclear and thermal radiation, with particular emphasis upon those factors of importance to the military services.

(Continued on reverse side)

ENCL (1) 730-95 Ltr

TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4 *(Use supplemental sheets if necessary)*

8. TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle answer)	FORMAL COURSE (Circle answer)
Supplement (1)				
a. Principles and practices of radiation protection			Yes No	Yes No
b. Radioactivity measurement standardization and monitoring techniques and instruments			Yes No	Yes No
c. Mathematics and calculations basic to the use and measurement of radioactivity			Yes No	Yes No
d. Biological effects of radiation			Yes No	Yes No

9. EXPERIENCE WITH RADIATION. *(Actual use of radioisotopes or equivalent experience.)*

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
Supplement (1)				

10. RADIATION DETECTION INSTRUMENTS *(Use supplemental sheets if necessary.)*

TYPE OF INSTRUMENTS (Include make and model number of each)	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE (mr/hr)	WINDOW THICKNESS (mg/cm^2)	USE (Monitoring, surveying, measuring)
Supplement (2)					

11. METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE.

Instruments are calibrated quarterly with Co^{60} and Cs^{137} which were certified by NBS or measured with NBS certified thimble chambers.

12. FILM BADGES, DOSIMETERS, AND BIO-ASSAY PROCEDURES USED. *(For film badges, specify method of calibrating and processing, or name of supplier.)*

Supplement (3)

INFORMATION TO BE SUBMITTED ON ADDITIONAL SHEETS IN DUPLICATE

13. FACILITIES AND EQUIPMENT. Describe laboratory facilities and remote handling equipment, storage containers, shielding, fume hoods, etc. Explanatory sketch of facility is attached. *(Circle answer)* Yes No Supplement (4)

14. RADIATION PROTECTION PROGRAM. Describe the radiation protection program including control measures. If application covers sealed sources, submit leak testing procedures where applicable, name, training, and experience of person to perform leak tests, and arrangements for performing initial radiation survey, servicing, maintenance and repair of the source.

Supplement (4)

15. WASTE DISPOSAL. If a commercial waste disposal service is employed, specify name of company. Otherwise, submit detailed description of methods which will be used for disposing of radioactive wastes and estimates of the type and amount of activity involved. Supplement (5)

CERTIFICATE (This item must be completed by applicant)

16. THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATE ON BEHALF OF THE APPLICANT NAMED IN ITEM 1, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PART 30, AND THAT ALL INFORMATION CONTAINED HEREIN, INCLUDING ANY SUPPLEMENTS ATTACHED HERETO, IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF.

U.S. Naval Radiological Defense Laboratory

Applicant named in item 1

Date 28 April 1967

By: Ed. R. Jacobson

Chairman, Radiological Safety Committee

Title of certifying official

17 7 59 AM '67

WARNING.—18 U. S. C., Section 1001; Act of June 25, 1948; 62 Stat. 749; makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

☆ U.S. GOVERNMENT PRINTING OFFICE : 1964 O—745-381

SUPPLEMENT 1 (Item 5)

Radiological Safety Committee Members and Qualifications

Dr. Edward R. Tompkins, Chairman

Chairman, Radioisotope Committee, NRDL, November 1962 to date; Associate Scientific Director, NRDL, November 1961 to date; Scientific Liaison Officer, ONR, London, England, July 1960 -- October 1961; Head, Chemical Technology Division, NRDL, December 1951 -- June 1960; Consultant, NRDL, five months -- 1951; Consultant, U. C. Radiation Laboratory, Berkeley, California -- 16 months; Assistant Manager and Director of Research for Scientific Service, Inc., Berkeley, California -- 18 months; Radiochemist, AEC, Advisory Field Service, Oak Ridge, Tennessee -- 6 months; Supervisor, Chemistry Department, Clinton Laboratory, Oak Ridge, Tennessee -- 4 years; Reasearch Chemist, Armour Research Foundation, Chicago, Illinois, 1 year.

Albert L. Smith, Alternate Chairman

Head, Health Physics Division, NRDL, February 1962 to date; Head, Radiological Safety Branch, Health Physics Division, NRDL, July 1956 -- February 1962; Health Physicist, NRDL, October 1951 -- July 1956; Health Physicist, General Electric Corporation, Hanford Atomic Products Operation, January 1948 -- October 1951.

Dr. Myron I. Varon, CDR, MC, USN, Alternate Chairman

Radiological Medical Director, NRDL, August 1965 to date; Ph. D. Department of Radiation Biology, University of Rochester, 1962--1965; Radiological Safety Officer, USS Long Beach, 1960--1962; AEC, Naval Nuclear Power Program, Idaho Falls, Idaho, 1959--1960; Armed Forces Special Weapons Project, 1958--1959; Medical Officer, USS Lenawee, (APA-195), 1956--1958; Internship, Cook County Hospital, 1955--1956; M. D., Northwestern University, 1955.

Dr. Edward L. Alpen

Head, Biological and Medical Sciences Division, NRDL, April 1959 to date; Head, Biophysics Branch, NRDL, 1956 -- April 1959; Head, Thermal Injury Branch, NRDL 1952 -- 1956; Investigator in Thermal Injury Branch, NRDL, April 1951 -- September 1952; Assistant Professor Pharmacology, George Washington University, Washington, D. C., January 1950 -- April 1951.

Supplement 1 (Item 5) (Continued)

Dr. Richard Cole

Head, Nuclear Technology Division, NRDL, November 1966 to date; Head, Chemical Technology Division, NRDL, September 1964 -- November 1966; Head, Countermeasures Evaluation Branch, Military Evaluations Division, May 1959 -- September 1964; Radiological Chemist, Military Evaluations Division, December 1956 -- May 1959; Radiological Chemist, Chemical Technology Division, March 1952 -- December 1956.

Dr. C. Sharp Cook

Head, Radiation Physics Division, November 1966 to date; Head Nucleonics Division, NRDL, November 1965 -- November 1966; Physics Consultant to Scientific Director, NRDL, 1962 -- 1965; Fulbright Research Fellow, Aarhus University, Aarhus, Denmark, 1960 -- 1962; Head, Nucleonics Division, NRDL, April 1960 -- August 1961; Head, Radiation Characteristics and Effects Branch, NRDL, 1959 -- 1960; Head Nuclear Radiation Branch, NRDL, 1953 -- 1959; Assistant Professor of Physics, Washington University, St. Louis, Missouri, 1948 -- 1953; Research Assistant, Indiana University, 1946 -- 1948; Teaching Assistant, Indiana University, 1940 -- 1942.

Paul E. Zigman

Head, Technical Management Office, NRDL, April 1964 to date; Head, Applied Research Branch, 1961 -- 1964; Supervisor and Research Specialist, Atomics International, 1959 -- 1961; Head, Analytical and Standard Branch, NRDL, 1955 -- 1959; Investigator, NRDL 1948 -- 1955.

Dr. William E. Kreger

Head, Physical Sciences Division, NRDL, November 1966 to date; Director, Cyclotron Project, NRDL, November 1965 -- 1966; Head, Nucleonics Division, NRDL, 1961 -- 1965; Head, Nuclear Radiation Physics Branch, NRDL, 1958 -- 1961; Senior Investigator (Nuclear Physicist), Shielding Section, NRDL, 1952 -- 1957.

Each member has two alternates whose qualifications are commensurate with their positions, usually Branch Heads.

SUPPLEMENT 2 (Item 10)

Radiation detection instruments available at NRDL include the following:

Instrument	Type	Quantity On Hand	Range	Purpose
Victoreen Vamp Model 808A	End Window GM	2	0-50 mr/hr	β-γ continuous area monitoring alarm system
Victoreen Model 440	Ionization chamber	1	0-300 mr/hr	Broad energy range γ dose rate monitoring.
Berkeley 2750	Side Window GM	27	0-50,000 c/m	β-γ dose rate and contamination monitoring.
Eberline E112B	Side Window GM	6	0-20 mr/hr	β-γ dose rate and contamination monitoring.
Nuclear 1615B	End Window GM	3	0-50,000 c/m	β-γ dose rate and contamination monitoring.
AN/PDR 27	End Window GM Enclosed GM	67	0-5 mr/hr 0-500 mr/hr	β-γ dose rate and contamination monitoring.
El-Tronics CP3D (Cutie Pie)	Ionization Chamber	13	0-10 rad/hr	β-γ dose rate monitoring.
CP3DM (Cutie Pie)	Ionization Chamber	25	0-10 rad/hr	β-γ dose rate monitoring.
CP3DMS (Cutie Pie)	Ionization Chamber	10	0-100 rad/hr	β-γ dose rate monitoring.
AN/PDR-TIB	Ionization Chamber	18	0-50 r/hr	γ dose rate monitoring.

Supplement 2 (Item 10) (continued)

Instrument	Type	Quantity On Hand	Range	Purpose
Keleket K-240	Five Fold (GM)	1	10^4 Counts	β-γ hand and foot counter.
Austin, Model 4.	Five Fold (GM)	2	10^4 Counts	β-γ hand and foot counter.
IM-113 A/PDR	Side Window GM	26	0-20 mr/hr	β-γ dose rate and contamination monitoring.
Juno No. 3	Ionization Chamber	5	0-5000 mr/hr	α β- and γ dose rate and contamination monitoring.
Berkeley 2750 (Modified)	End Window GM (with thin window)	2	0-50,000 c/m	Low energy beta monitoring.
Eberline PAC 3G	Gas proportional	12	0-100,000 c/m	α contamination monitoring.
Eberline (PAC ISA)	Scintillator	8	0-2,000,000 c/m	α contamination monitoring.
Ludlum Model 11 with High Density Polyethelene Moderators	Scintillation	1	0-50,000 counts per minute	neutron dose rate monitoring.
Victoreen Model 488	BF_3 proportional counter	1	0-80,000 counts per minute	neutron dose rate monitoring.
NRDL Tritium Meter	Ionization Chamber	1	10^{-3} µc/cc sensitivity	Tritium air contamination monitoring.
T-289 Tritium Detector	Ionization Chamber	3	10^{-5} µc/cc sensitivity	Tritium air contamination monitoring.
T-290 Tritium Detector	Ionization Chamber	2	10^{-3} µc/cc sensitivity	Tritium air contamination monitoring.

Supplement 2 (Item 10) (continued)

Instrument	Type	Quantity On Hand	Range	Purpose
Dosimeters IM-9E/PD	Direct reading pocket chamber	73	0-200 mr	γ personnel dosimetry.
Dosimetry, Bendix Model 866	Direct reading pocket chamber	19	0 - 1R	γ personnel dosimetry.
Dosimeter, Bendix Model 611	Direct reading pocket chamber	25	0-5 R	γ personnel dosimetry.
Dosimeter IM-19B / PD	Direct reading pocket chamber	25	0-10 R	γ personnel dosimetry
Dosimeter, Landsverk with adjustable finger ring	Indirect reading pocket chamber	10	0-2 R	γ personnel hand dosimetry.
Reader-Charger Landsverk	Electrometer	1	-	Reading and charging indirect reading pocket chamber.
Film Badge	DuPont 555 and 1290.5 filter film holder	9000	25 mr to about 3000 r	β-γ personnel dosimetry.
Film Badge	Eastman NTA film	65	20 mrem to 10,000 mrem	Fast neutron personnel dosimetry.
Film Badge finger ring	DuPont 508 and 1290	15	25 mr to about 3000 r	β-γ personnel hand dosimetry
Staplex, high volume	Air Sampler	16	25 cfm	α β -γ aerosol sample collection.
Schmidt, low volume	Air Sampler	10	1.75 cfm	α β -γ aerosol sample collection.

Supplement 2 (Item 10) (continued)

Instrument	Type	Quantity On Hand	Range	Purpose
Port-A-Vac	Air Sampler	5	6×10^5 cc/min	$\alpha\,\beta$-γ aerosol sample collection.
Nuclear-Chicago Model 151A with scaler inter-changeable end window GM and side window GM	GM counter	1		β-γ air, water and wipe sample counting.
Baird-Atomic Model 132 Scaler with end window GM	GM Counter	1		β-γ air, water and wipe sample counting.
Berkeley Scaler (1-218) with end window GM	GM Counter	1		β-γ air, water and wipe sample counting.
RCL Scaler with end window GM	GM Counter	1		β-γ air, water and wipe sample counting.
Radiation Instruments Development Laboratories Scaler with scintillation counter	Scintillation Counter	1		α air, water, and wipe sample counting.
Nuclear-Chicago Scaler Model 202 with inter-changeable alpha and beta scintillation counter	Scintillation Counter	1		$\alpha\beta$ air, water and wipe sample counting.
Baird-Atomic Single Channel Spectrometer with 4"x4" sodium iodide thallium activated crystal	Scintillation Counter	1		γ air, water and wipe sample counting and isotope identification.
Nuclear-Chicago Model 186A Scaler with gas proportional counter	Gas proportional	1		α beta and low energy beta air, water and wipe sample counting.

SUPPLEMENT 3 (Item 12)

The standard film badge dosimeter used at NRDL has five filters of thickness 0.032" aluminum, 0.027" lead, 0.015 cadmium, and 0.010" paper and 0.125" plastic. It can be calibrated so as to give effective energy information as well as dosage information. The film used is a two-film packet, containing DuPont 555 and 1290 film, and can measure gamma exposures from 25 mr to about 3000 r.

The DuPont 555 and 1290 films are calibrated for response to beta radiation with a normal uranium plaque, and for response to gamma radiation with a cobalt-60 source, and various energies of X-ray, using NBS-certified thimble chambers as a standard. All calibration exposures are made with the film inside the badge.

Neutron film badges (NTA film) are also used when neutron sources are handled, or when personnel are in proximity to nuclear reactors or neutron producing particle accelerators. A neutron film badge service is supplied by a commercial firm (Radiation Detection Company, Mt. View, California).

Finger ring film badges (beta-gamma) are used whenever there is the possibility of hand exposure in excess of that measured by the body badge. A finger ring service is supplied by a commercial firm (Radiation Detection Company, Mt. View, California).

Bioassay screening of personnel is accomplished by gross beta determinations. Rare earths and heavy metals are precipitated from urine by a reagent containing ammomium oxalate, oxalic acid and acetic acid. The precipitate is beta counted.

Tritium in urine is measured by liquid scintillation counting. Plutonium and uranium are separated from urine by ion exchange methods and counted for alpha and/or beta activity. Barium, strontium, radium and polonium are separated and counted by procedures outlined in USNRDL-TR-451, "Analytical Procedures at the USNRDL for the Determination of Certain Radioelements in Urine" by Shipman and Weiss.

A whole-body counter with a 4" x 4" NaI crystal shielded by a 8" iron wall room and coupled to a 100 channel spectrometer provides a means for estimating the quantity and identity of gamma-emitters in the body. This counter is used in cases of suspected body uptake of certain radioelements.

Supplement 4 (Items 13 and 14)

Revised 6/66

RAD SAFE ASPECTS OF THE CAMP PARKS RADIATION RANGE

1. Introduction

The NRDL Camp Parks Radiation Range is a 15,000 curie installation consisting of five 3,000 curie Co-60 sources, each independently housed and operated and each producing a 4 π radiation field.

This general Laboratory facility is a Co-60 range to provide a free air, high intensity large area gamma radiation field.

Three basic configurations are provided:

a. A point source on or at a distance from the ground is provided by a single 3000 curie source which can be raised to a maximum height of 80 feet.

b. A large area, fairly uniform radiation field or a high intensity field over a smaller area is provided by four movable 3000 curie sources at near-ground level.

c. The use of both (a) and (b) configurations simultaneously can be provided.

The facility site is remote from normal traffic and exclusion is offered by the Camp Parks boundary.

Scheduled use of the range falls into three general categories:

a. The radiation physics program conducted with short-term exposures during daylight hours.

b. The Bio-Med program conducted with both short-term daylight hour exposures and with long-term, around the clock exposures.

c. Maintenance periods during which the facility will be radiologically secured.

2. Definition of Terms

a. Restricted Area Fence - The fence comprising the outer perimeter of the range area.

b. High Radiation Area Fence - The fence comprising the outer perimeter of the area wherein dose rates in excess of 100 mr/hr will be produced by the exposed five sources.

c. Source Area Fence - The fence bounding the area where the five sources are located.

d. Tower Source - The source which can be raised up to a point 80 feet above the ground.

e. Track Source - Any of the four ground level sources.

f. Control Center - The building from which sources are operated and from which the source area can be observed.

g. Machinery Shed - The building containing machinery required for movement of the sources.

3. Description of Facilities

A. Site

The facility is located at N 453700, E 1598700 (California coordinate system) in a small valley on the northern edge of Camp Parks. Site elevation 500 feet with surrounding hills to elevations of 650 feet. The site area is approximately 290 acres. The site layout is shown in enclosure (1), "Proposed Test Range, Camp Parks".

B. Restricted Area

a. The site is bounded by a 5 foot exclusion ("Restricted Area Fence") consisting of hog wire topped by two strands of barbed wire. The total fence length is over 14,000 feet, at an average distance of 2400 feet from the source, the minimum fence distance being 1200 feet.

b. The "High Radiation Area Fence" is along the 100 mr/hr radiation line, about 800 feet from the source array consisting of 8 feet of chain link wire topped with an outrigger with three strands of barbed wire.

c. An additional close-in fence (the "Source Area Fence") prevents entry by animals and deters entry by unauthorized personnel to the immediate source area (see enclosure (2), "Camp Parks Radiation Range Site Plan", NU-61-572, Sheet A) and is similar in construction to the Restricted Area fence.

d. "Caution - Radiation Area" signs are placed at 100 foot intervals along the Restricted Area fence. Additional "Danger - High Radiation Area" signs are placed at 50 foot intervals along the High Radiation Area fence.

C. Source Description and Arrangement

The Co-60 sources consist of nickel plated cobalt wafers doubly encapsulated in stainless steel. The sources are contained, when not in use, in standard lead pigs with a minimum of 10" of shielding, sufficient to reduce radiation levels to about 1 mr/hr at the surface. Enclosures (3) and (4), Drawing NU-61-572, Sheets 5 and 6 show details of capsule and shield assemblies. (Sheet 5 is the assembly for the four track sources and Sheet 6 is the assembly for the single tower source, to be described later.)

The source capsule is attached to the shielding plug, so that removal of the plug will expose the source.

a. Track Sources

Four of the 3000 curie sources are mounted in their containers on the small flat-top, narrow-gauge railroad carts. The carts stand on a rail crossing 200 feet by 120 feet with capability for positioning at any point on the rails.

A hydraulically operated cylinder is connected to a lifting arm which raises the source out from the source shield and, through a cam action, rotates it through 130°. Hydraulic fluid is supplied from a hydraulic air-oil tank which is pressurized by air. The air is supplied from a compressor in the machinery shed, through underground lines to ground surface lines laid along the tracks. Quick-connect stations adjacent to the legs of the rail tracks permit air hook-up to the track source carts through flexible hoses. Two sets of lines are provided; one for air to the air-oil tank and one for air directly to the top of the cylinder to provide for positive return of the source to the shielded position. This is an emergency feature; the sources are normally returned through gravity action after release of the air pressure. Enclosure (5), "Nucleonics Radiation Range, , 12,000 Curie Sources", shows the arrangement of the track sources and the source movement action. Enclosure (6), "Electro-Mechanical Operational Schematic, Track Sources" shows the air and power control arrangement.

A feature of the facility is that a continuous air pressure is required to keep the sources in the exposed position. Failure of the air compressor or breakage of the air supply line will cause the sources to return to the shielded position.

b. Tower Source

The fifth source is housed in a similar container at the base of an 80 foot steel tower. The source is lifted from the container by a lifting arm attached to the shielding plug. The lifting arm is hoisted up to the top of the tower along a steel track, via a cable and pulley arrangement. The cable is pulled by a motor-driven drum from the machinery shed, 250 feet away. Enclosure (7), "Nucleonics Radiation Range, 3000 Curie Tower Source", shows the arrangement and operation of this source. The tower top is provided with electrical shielding to prevent lightning damage to the pulley and cable.

Enclosure (8) "Electro-Mechanical Operational Schematic, Tower Source" shows the mechanical and electrical features of the source.

D. Controls and Indicators

The source movement equipment is located in the Machinery Shed. It is controlled by signals from the control center, 1800 feet from the source facility.

An air compressor with storage tanks supplies air to the track sources through a solenoid control valve. This solenoid valve requires electrical power to open. Loss of control power will release the air, allowing the track sources to return to their containers.

The tower source is lifted (and lowered) by a motor driven cable drum. Loss of power here will close a magnetic clutch, holding the source in position. A mechanical clutch between the motor and the drum is also provided. Personnel may enter the machinery shed to release this clutch. A 12 inch concrete wall provides additional shielding during this operation.

Location of machinery shed and control center is shown in enclosure (2). Indicator lights on the control panel show the position of the source controls, whether "UP" (in the exposed position) or "DOWN" (in the shielded position).

The details of indicator light operation are shown in enclosures (6) and (8). The tower source indicator light goes on when the source clears the container. In the case of the track sources the indicator light goes on when air is applied to lift the source.

A radiation detection system in the control center provides an indication when any source is exposed. This system consists of a detector (a non-saturating GM tube located in a test station box), 10 feet from the track intersection. The detector actuates a rate meter in the control center whenever the flux in the source area exceeds 100 mr/hr. In addition, a portable low-range instrument (with scales of 0-.5, 0-5, 0-50, 0-500 mr/hr) shall be standard equipment in the control center.

The radiation detection system actuates the warning lights at Gates #1, 2, 3, 8 and will actuate a blinking light and audible warning signal at gate #10 and 12. The gates are in the high radiation area fence nearest the control center.

A system is installed to provide audible warning during the movement of sources from the shielded position. A Klaxon horn mounted on the control center provides enough volume to be heard over the entire high radiation (>100 mr/hr) area. The horn is activated by the same controls that move the sources.

4. Source and Range Safety

A. General

Entry to the area is controlled by a combination of the Restricted Area Fence, signs, light signals and by either on-site surveillance or on-station patrol.

During short term daylight operations the facility will be manned and continuous surveillance maintained by a minimum of two persons, one of whom will be a qualified operator. During around-the-clock operation of the facility, all gates will be locked, warning signs will be displayed, warning lights will be lit and during the hours of darkness the High Radiation Area signs will be illuminated. A NRDL duty watch will be maintained on the Camp Parks station with the sole responsibility of range safety. This watch will consist of Navy enlisted personnel who are trained as range operators. Their instructions are to secure the range in the event of fire, unauthorized entry or other emergency. He will, during his watch, complete the "Radiation Range Watch Check List", enclosure (9).

During maintenance periods, the sources will be locked in their containers and the "Restricted Area" boundary will become the innermost "Source Area" fence. The remainder of the area may be opened for cattle grazing for purposes of control of ground cover.

A rigorous key accountability and control procedure is used. The keys to the padlocks locking the sources and those to the source controls are issued only to qualified operators or duty watch personnel. Only two such sets are in existence. When not in use, one set is kept in the custody of the Radiation Range Supervisor at Camp Parks. The keys are issued only to personnel authorized to enter the area for maintenance or other reasons and only when such entry has been determined to be safe.

B. Exclusion of Personnel

a. Restricted Area

The outer perimeter (Restricted Area) fence, marked with "Caution - Radiation Area" signs will serve as the boundary to the restricted area.

The fence has eight access gates which will be secured by padlocks during source use, the keys to be controlled by the operator.

The maximum radiation level at this fence, for 4 source operation, will be 4 mr/hr. The areas outside the fence for which the maximum exposure levels, considering 168 hour per week usage, will be greater than 100 mr/week area shown on enclosure (1). In view of the fact that occupancy of these areas by unbadged personnel is estimated to be less than one hour per week, an exception is requested from the provisions of 10CFR20, "Permissible Levels of Radiation in Unrestricted Areas".

b. High Radiation Area

The inner, high security, fence serves as the High Radiation Area ($>$100 mr/hr) boundary. This fence is posted at 50 foot intervals with "High Radiation Area" signs. Three access gates are provided, secured by padlocks during source use, the keys controlled by the operator.

The padlocking and key control procedure is designed to serve as high radiation area security in lieu of the control device or alarm signal designated in 10CFR20, paragraph 20.203. An exception is therefore requested from the provisions of 10CFR20.203.

During around-the-clock operations illumination is provided during the hours of darkness and of fog for the "High Radiation Area" signs.

c. Source Area

The innermost (Source Area) fence is posted with "High Radiation Area" signs indicating radiation levels present. These signs are made removable, for times when the source is not in use. Gate padlocking with key control by the operator is practiced as with the outer fences.

This fence will serve as the "Restricted Area" boundary, with appropriate posting, during periods when the Radiation Range is not in use.

d. Signs and Signals

In addition to the signs previously mentioned, a bright flashing (300 watt) red light on the top of the tower and rotating beacon lights and horns near ground level in the track source array provides warning whenever a source is exposed.

A flag pole has been provided adjacent to the control center for a red flag, to be hoisted whenever a source is in use.

e. Surveillance

For daylight operations, the source area will be kept under continuous surveillance from the control center.

For the round the clock operations, a duty watch will be maintained by a qualified operator. The operator will make periodic checks of the Radiation Range and will be within 10 minutes travel time of the Radiation Range at all times.

C. Source Malfunctions

The problem of source malfunction, i.e., inability to return the source to the container, is the most serious potential operating problem. The very high dose rates preclude the use of semi-remote techniques to return a source to its container. The mechanical features of source movement are relatively simple and minimize the possibility of source hang-up. The source movement mechanisms were thoroughly tested before final installation of the sources. In addition, all source movement mechanisms are tested semi-annually by replacing the live sources with dummy loads and operating the source movement mechanisms.

a. Track Sources

The track sources are normally returned to their containers by the action of gravity after the air pressure is released. If the air release valve malfunctions, the air can be released manually in the machinery shed located about 250 feet from the source. A concrete shielding wall, 12 inches thick, has been installed on the side of the machinery shed toward the source area. This will reduce exposure levels by a factor of 10 and will enable emergency actions to be taken comparatively leisurely. The radiation level in the shed is about 100 mr/hr with 4 sources exposed.

If a mechanical hang-up occurs in the air-cylinder-lifting mechanism, the reverse air can be turned on from the control center providing a positive return action.

Solenoid operated air valves are installed on each source cart and are connected to the air supply lines to each cart. These are remotely operated and affords individual source operation. This individual operation enables the operator in the event of a one-source hang-up, to house the other three sources, thus reducing radiation levels of 75%.

Explosive bolts holding the source to the lifting arms are provided to be used in the extreme case of a hang-up resisting all return efforts. By grappling the source with a portable crane from about 100 feet where the radiation level is about 4 r/hr, the explosive bolts can be detonated through the crane hook and the source moved to a shielded container. Personnel exposures up to several R may be involved.

b. Tower Source

The tower source is moved to the exposure position through a straight lifting motion along a vertical track with power provided by a cable. The weight of the source lifting arm arrangement is 200 pounds, sufficient for positive gravity return.

Hang-up at the point of entry to the container through misalignment is minimized by providing a taper, both on the source plug and on the container entry port.

Hang-up of the cable is minimized by the use of keepers on the pulleys. A cable tensioner is provided to maintain a constant cable tension.

A magnetic brake on the cable drum drive motor will prevent motor movement when the power is off. A mechanical clutch and hand-operated brake are provided for manual lowering of the source in the event of power failure. This operation can be performed with a maximum exposure of 50 mr.

c. Exposures to Operating Personnel

Accidental exposure to operating personnel through movement of sources during work in the area will be prevented through the use of documented operating procedures. Padlocks will secure all sources into their containers during set-up time for an experiment. In addition, the controls for sources movement will be locked.

Electrical controls to the air compressor and the cable winch in the machinery shed will be deactivated during work in the source area. These controls, 250 feet from the nearest source, will be activated as the last step before clearing the area for an experimental run.

The operator has in his possession in the control center a portable radiation detector capable of measuring the level of radiation there at the time of source exposure. The AN/PDR-27, with ranges 0-0.5, 0-5, 0-50 and 0-500 mr/hr, or an equivalent instrument will be used.

The operator uses this instrument as one of his checks to confirm that sources are exposed or housed. He also takes the instrument with him upon entry to the source area after an exposure run. He operates the instrument on the most sensitive range (0-0.5 mr/hr) and observes the scale reading frequently during his approach to the area. If he observes any above-normal radiation levels he will notify the Radiation Range Supervisor and the Health Physics Representative.

5. Administrative Instructions

A. Radioisotope Committee

The Radioisotope Committee, composed of senior Laboratory members, is concerned with the aspects of compliance with NRDL's licenses for the possession and use of radioactive materials. This Committee reviews all experimental plans for work on the Radiation Range.

B. Radiological Policy Committee

The Radiological Policy Committee, composed of senior representatives from each of the Laboratory's Departments, is concerned with the overall radiological safety program of the Laboratory. This Committee reviews Radiation Range operating procedures, safety warning systems, accidental occurrences and makes recommendations to the Commanding Officer of a nature to improve the radiological safety environment.

C. Radiation Range Scheduling Committee

The scheduling function will be performed by the Camp Parks Radiation Range Scheduling Committee which will consist of representatives of user codes and the Radiation Range Supervisor. Chairmanship of the Committee will rotate semiannually between representatives of the Nucleonics (Code 940) and Bio-Medical Sciences (Code 920) Divisions. Code 170 shall be kept fully informed by the Committee Chairman of the scheduled use of the Radiation Range and shall adjust the schedule with the concurrence of the Chairman, if circumstances require it.

D. Radiation Range Supervisor

The Radiation Range Supervisor at Camp Parks maintains the radiation facility keys, is fully conversant with operation and with the control and safety features of the Radiation Range and maintains on-site control of operations.

The Radiation Range Supervisor is delegated certain command functions at Camp Parks and has overall responsibilities for the control maintenance and safety features of the Radiation Range. Specifically, he will:

a. Member of the Scheduling Committee.

b. Maintain custody of Radiation Range keys when not signed out to individual operators.

c. Maintain Radiation Range calibration data.

d. Maintain experimental equipment of a general nature associated with the Radiation Range.

e. Select Radiation Range operators and arrange for their training. (All operators will be approved by the Radioisotope Committee.)

f. Review maintenance, housekeeping and safety features of the Radiation Range.

g. Take action to correct deficiencies in range equipment or range operation.

E. Health Physics Division

The Health Physics Division will have the following duties:

a. Training of Radiation Range Operators.

b. Review of safety and area control features.

c. Environmental Monitoring.

d. Emergency actions in conjunction with Engineering Division and Radiation Range Supervisor.

An approved training program provides Radiation Range operators with all the qualifications required to operate the range in a safe and efficient manner. The training consists of classroom lectures, on-the-site operation and written examinations. (see enclosure 12)

A continuing inspection of the safety and area control features of the Radiation Range is made routinely, including radiation detection instruments, signs, signal lights and dosimetry equipment.

A leak test of all sources is made at six month intervals according to the procedures described in Section 8 of this submission.

In the event of any emergency a health physicist will report to the site to provide action in conjunction with the Engineering Division as appropriate to deal with the emergency.

F. Radiation Range Operators

During Radiation Range operation, including all around-the-clock schedules, the Radiation Range Operator will be assigned on-site responsibility for:

(a) safety procedures

(b) security of surveillance systems, facilities and equipment.

The Radiation Range Operator will be required to become competent in Radiation Range operation by completing a prescribed course of instruction.

Since all experimental work is scheduled in advance, the Radiation Range Operator will notify the Radiation Range Supervisor 48 hours prior to the experiment of his intentions to use his alloted time. The operator shall pick up the Radiation Range keys, the "Operational Log Book" and the "Pre-and Post-Operational Check Lists" from the Radiation Range Supervisor. The operator will retain key possession until completion of his testing period.

The operator will use the "Pre-and Post-Operational Check Lists" during his Radiation Range usage. He will note the completion of each part of the check list in his "Operational Log Book", along with any deficiencies and other unusual circumstances.

After completion of the experiment, the "Operational Log Book", check lists and the keys will be returned to the Radiation Range Supervisor, thus relieving the operator of further responsibility. The Radiation Range Supervisor will take action to correct any range deficiencies noted before the Radiation Range is used again.

6. Operational and Emergency Procedures

Operational and emergency procedures are presented as enclosure (10), "Radiation Range Operator Instruction Sheet and Check Off List for the Camp Parks Radiation Range" and enclosure (11) "Emergency Procedures for Camp Parks Co-60 Range".

These instructions will be used by the operator in his operation of the facility. Copies will be posted in the control center.

7. Source Loading Procedures

The sources were fabricated and loaded into capsules and into source containers by the General Electric Company, Vallecitos Atomic Laboratory, Pleasanton, California in their hot cell facilities. Fabrication was as indicated in enclosures (3) and (4). Vallecitos Atomic Laboratory provided a leak and wipe test before delivery.

The sources were transported, in their shielding containers, to Camp Parks for installation in the facility. All installation was made with the sources in the shielded position.

Enclosures to Rad Safe Aspects of the Camp Parks Radiation Range

1. DPWO Drawing #6-52043 Revised, Proposed Test Range, Camp Parks.
2. NRDL Drawing #61-572, Sketch 1-A - Camp Parks Radiation Range Site Plan.
3. NRDL Drawing #61-572, Sheet 5-A - 3000 Curie Cobalt 60 Container - Assembly plus Details.
4. NRDL Drawing #61-572, Sketch 6-A - Cobalt 60 Container - Assembly plus Details.
5. NRDL Health Physics Sketch, Nucleonics Radiation Range,12000 Curie Sources.
6. NRDL Drawing #61-572, Sketch 33, Electro-Mechanical Operational Schematic Track Sources.
7. NRDL Health Physics Sketch, Nucleonics Radiation Range, 3000 Curie Tower Source.
8. NRDL Drawing #61-572, Sketch 32, Electro-Mechanical Operational Schematic, Tower Sources.
9. Radiation Range Watch Check List.
10. Radiation Range Instruction Sheet and Check Off List for the Camp Parks Radiation Range.
11. Emergency Procedures for Camp Parks Co-60 Range.
12. Camp Parks Radiation Range Operation Training Manual and Course Certificate.

LEGEND:

— A — AIR
— D — DRAIN
— P — POWER
— S — SIGNAL
— X — FENCE

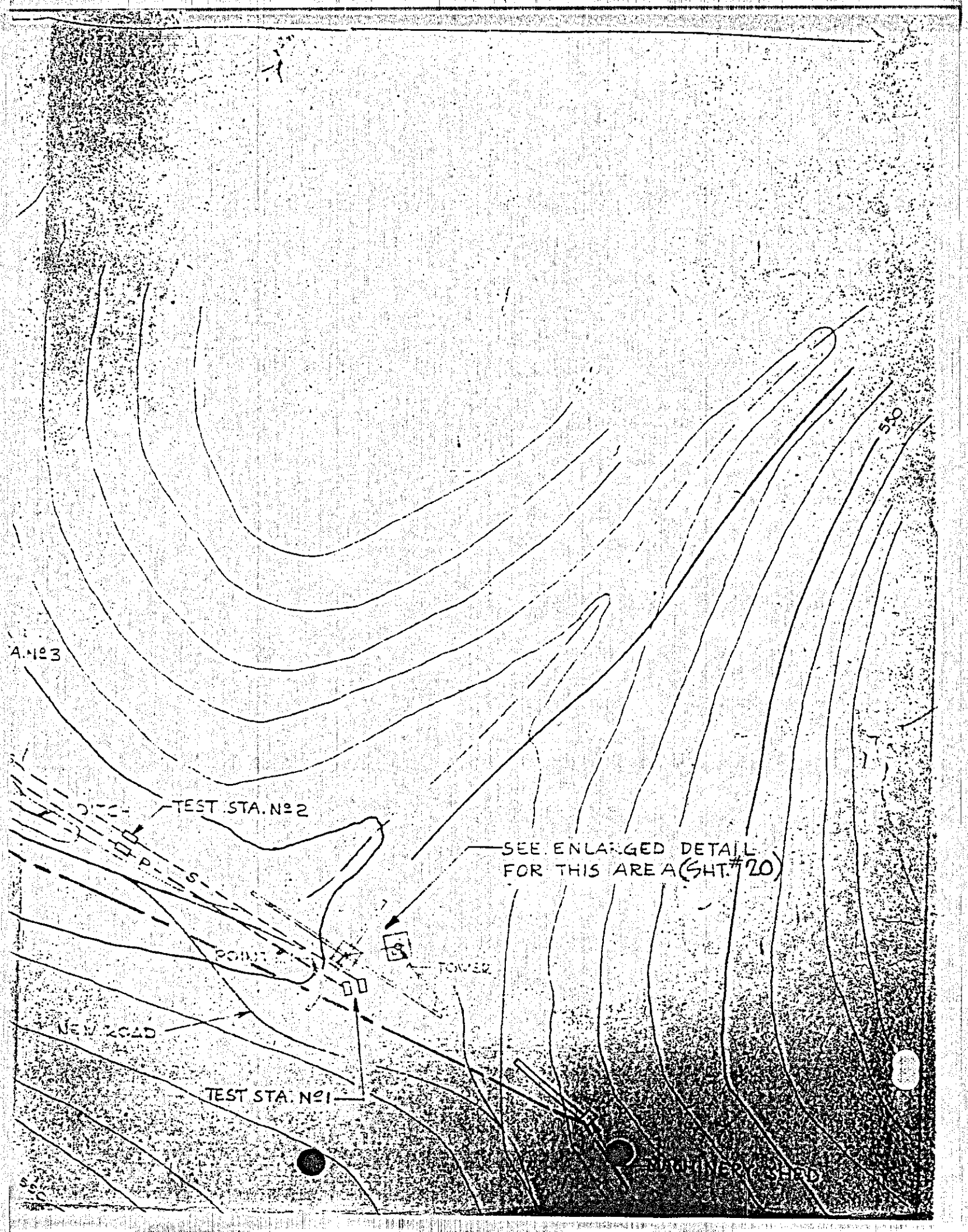
REV	DATE	DESCRIPTION	BY
A		ADDED EXISTING FENCE LIGHTS & ROTATING BEACON LIGHTS & HORNS W/ CABLING TO SUIT LAYOUT.	HB NU

DRAWN: G.S. GRILEY
TRACED:
DESIGNED:
CHECKED:
SUPV.:

NAVAL RADIOLOGICAL DEFENSE LABORATORY
SAN FRANCISCO 24, CALIF.

TITLE
CAMP PARKS
RADIATION FACILITIES
SITE PLAN

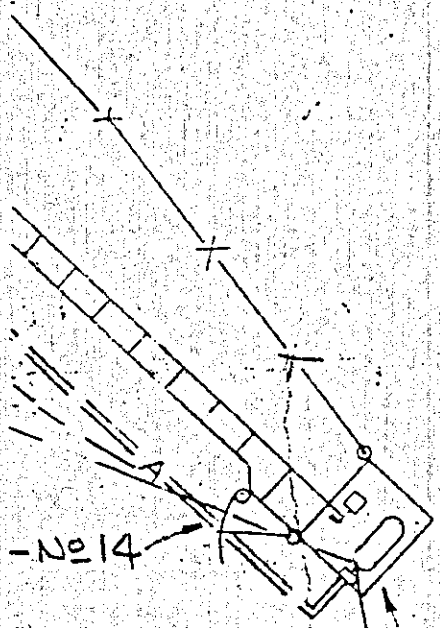
SUBMITTED: DATE 4-3-62 SCALE NOTED DWG. NO. NU 61-572 SHT 1 REV A


A. Nº3
TEST STA. Nº2
SEE ENLARGED DETAIL
FOR THIS AREA (SHT. #20)
TOWER
NEW ROAD
TEST STA. Nº1
RIVER SHED

ING

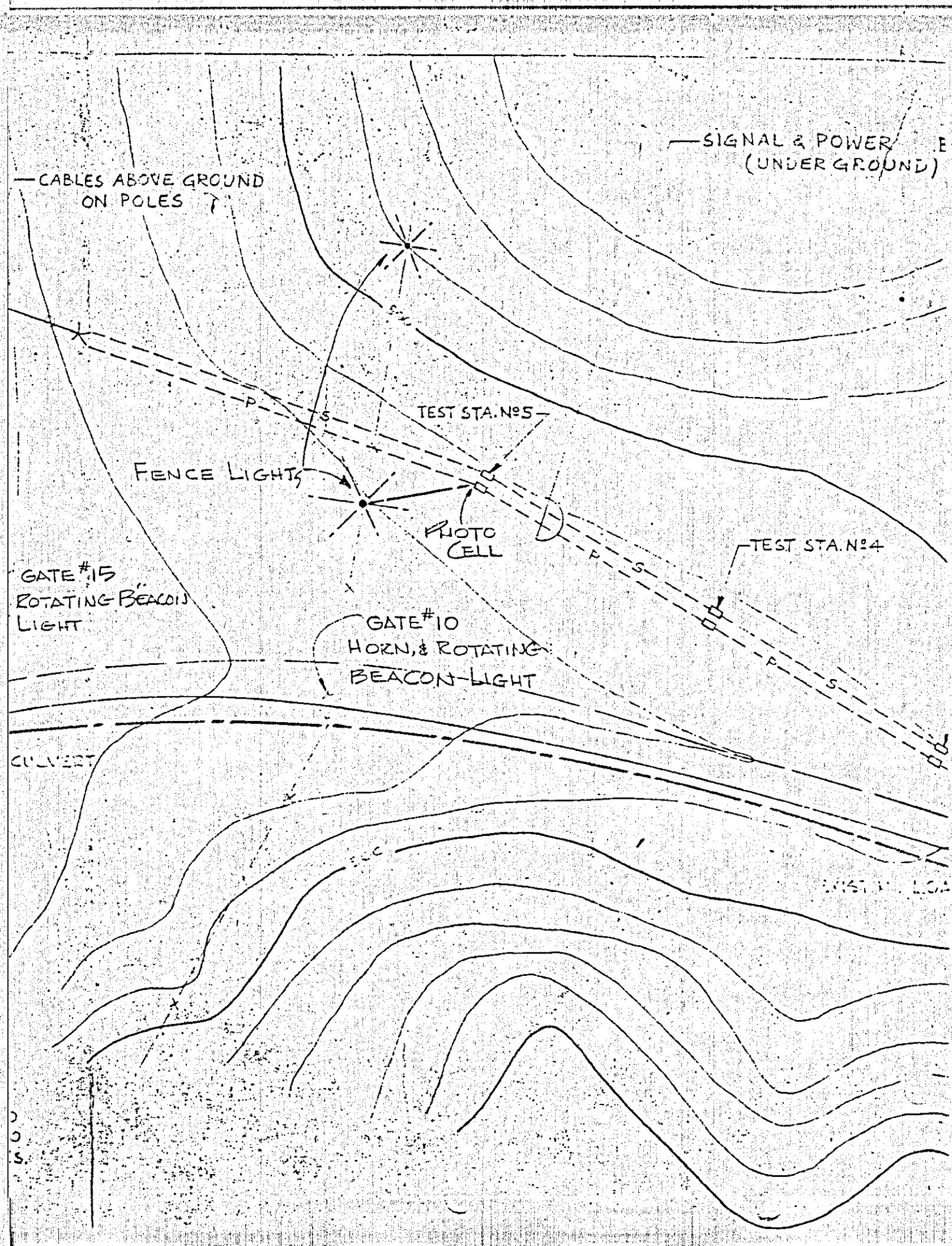
SITE PLAN

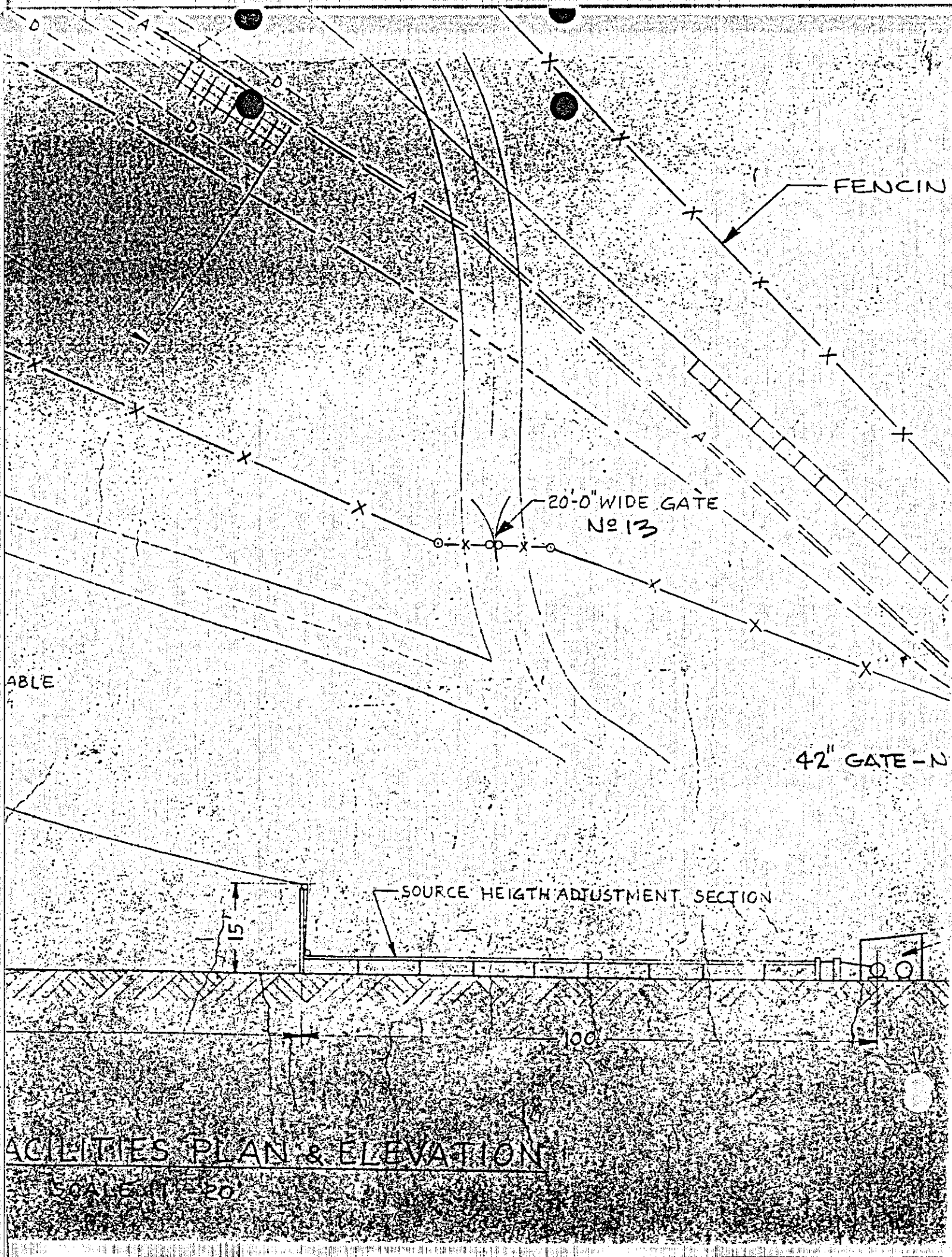
SCALE : 1" = 100'



-No 14

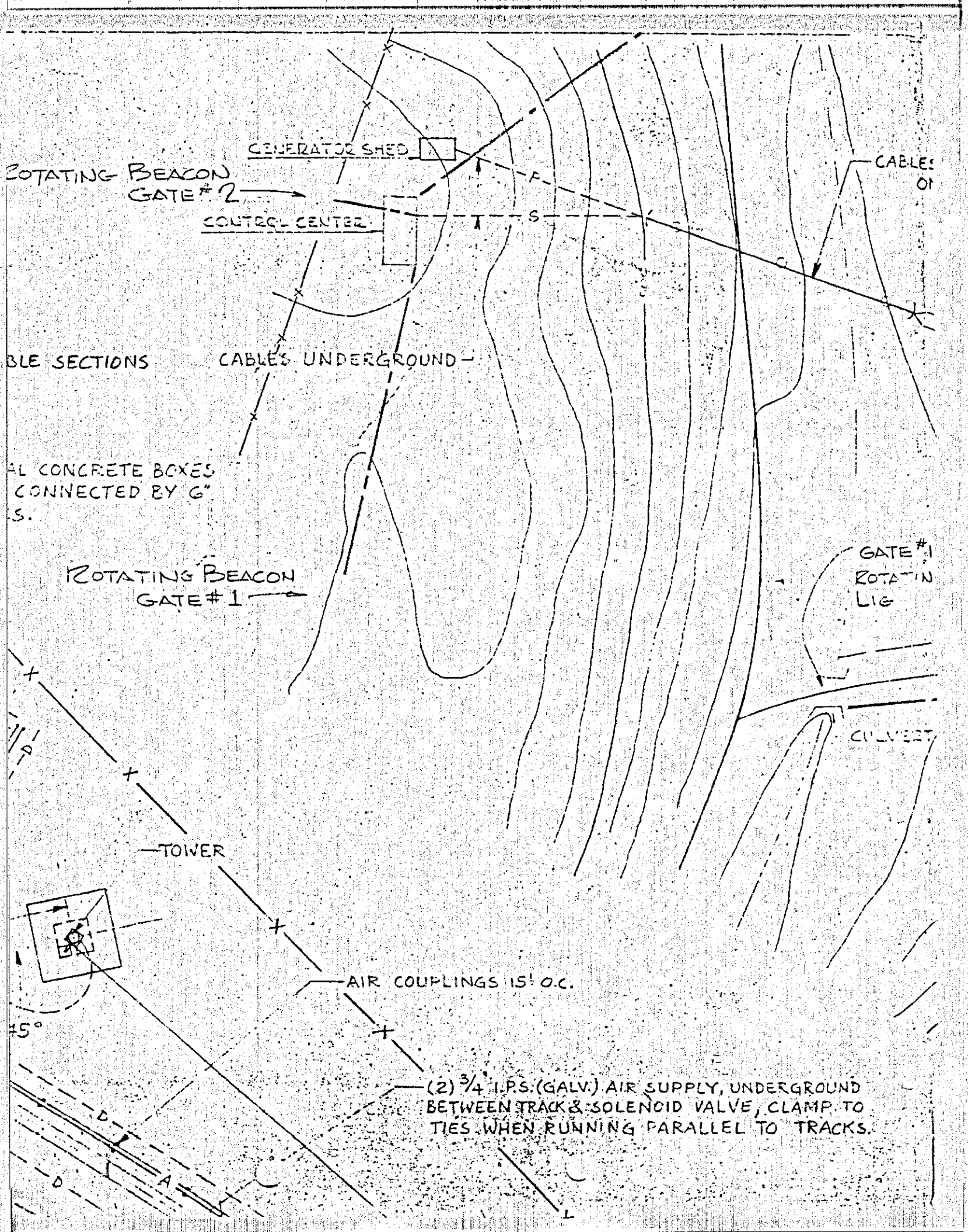
WINCH & COMPRESSOR STATION
(MACHINERY SHED)

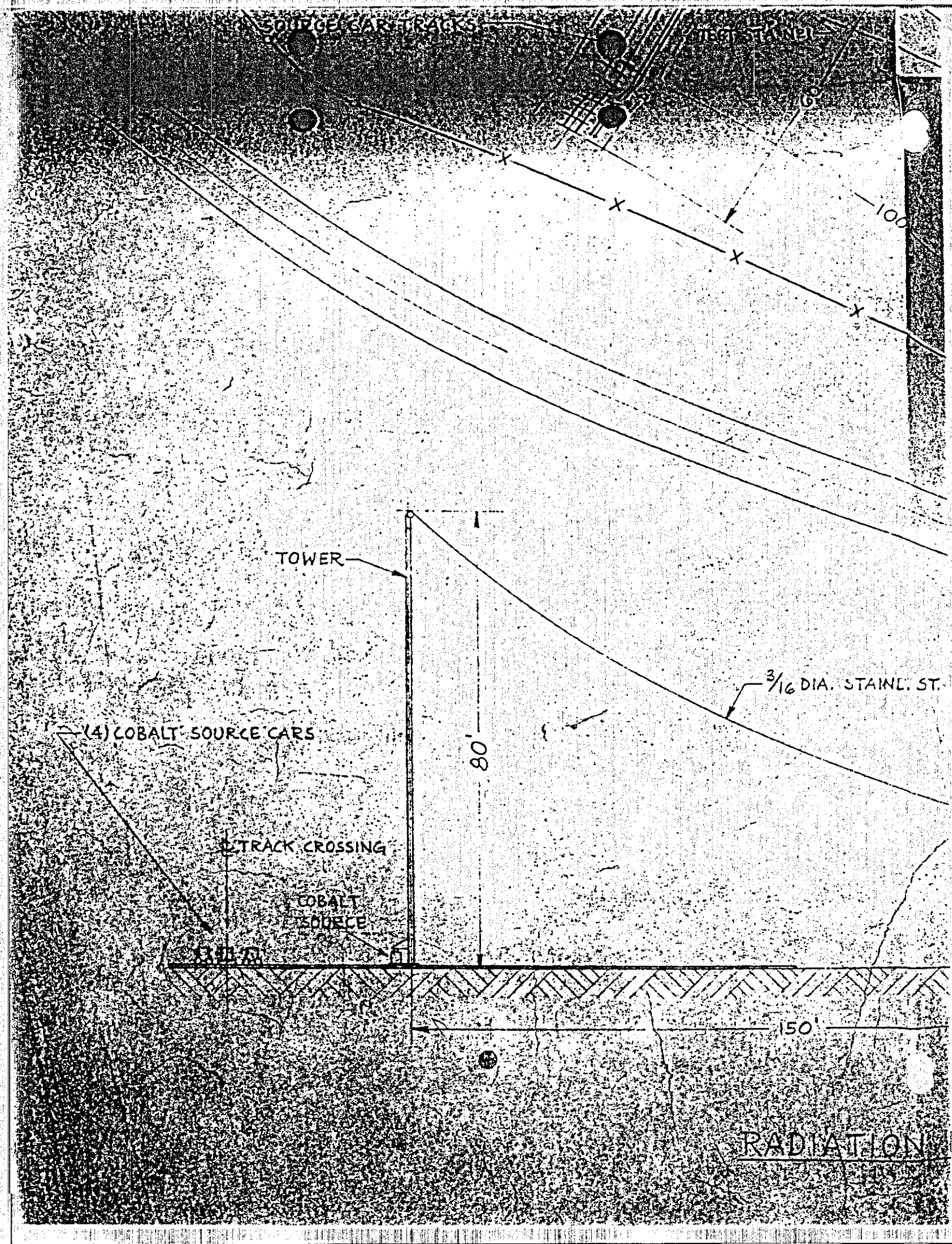

—SIGNAL & POWER
(UNDER GROUND)
—CABLES ABOVE GROUND
ON POLES
P
S
TEST STA. Nº5
FENCE LIGHTS
PHOTO
CELL
TEST STA. Nº4
GATE #15
ROTATING BEACON
LIGHT
GATE #10
HORN, & ROTATING
BEACON-LIGHT
CULVERT

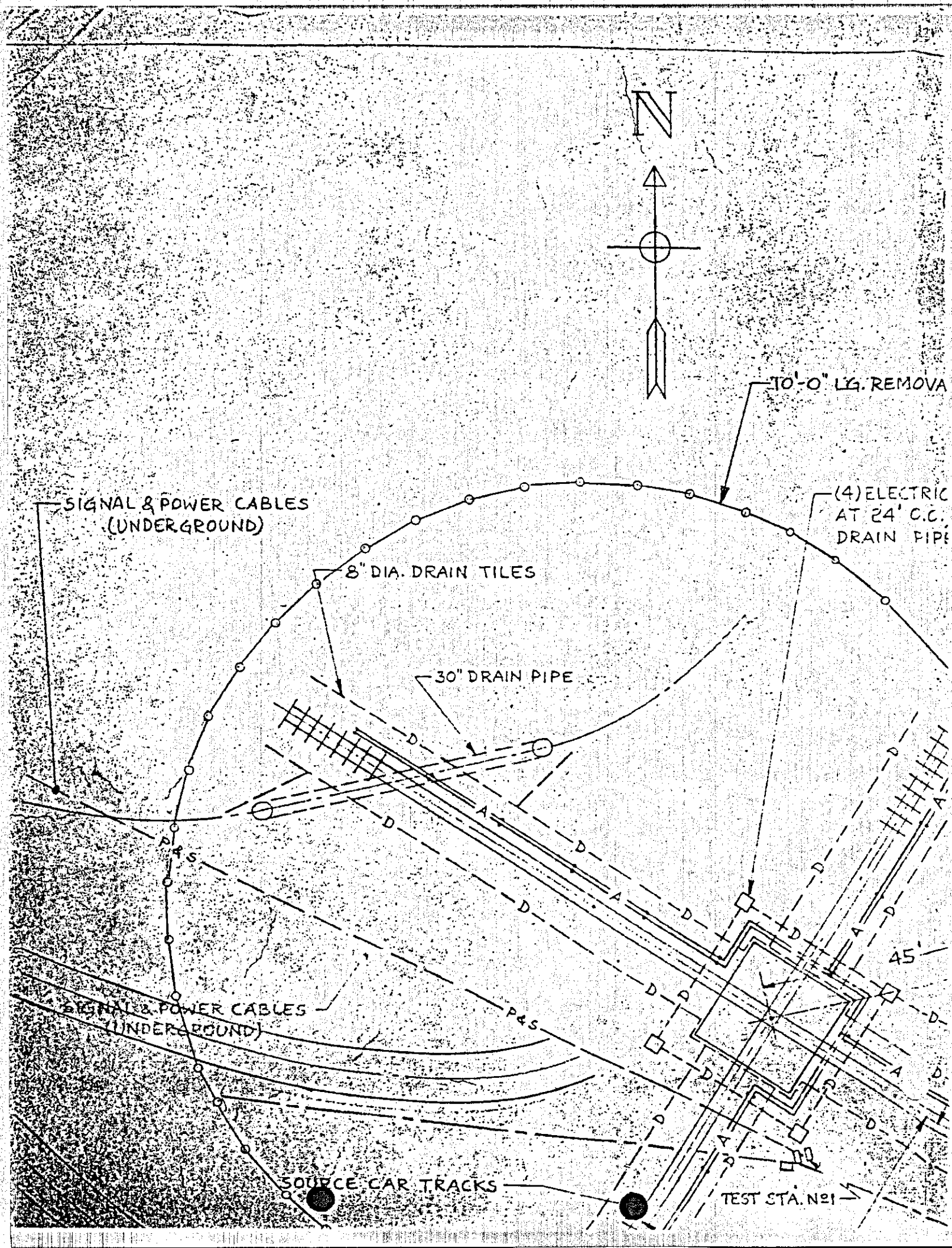


ACILITIES PLAN & ELEVATION

SCALE: 1" = 20'


GENERATOR SHED
ROTATING BEACON GATE #2
CONTROL CENTER
CABLES
UNDERGROUND
BLE SECTIONS
L CONCRETE BOXES
CONNECTED BY 6"
S.
ROTATING BEACON GATE #1
GATE #1 ROTATIN LIG
CULVERT
TOWER
AIR COUPLINGS 15' O.C.
45°
(2) 3/4 I.P.S. (GALV.) AIR SUPPLY, UNDERGROUND BETWEEN TRACK & SOLENOID VALVE, CLAMP TO TIES WHEN RUNNING PARALLEL TO TRACKS.


SOURCE CAR TRACKS
TEST STAND
100'
TOWER
3/16 DIA. STAINL. ST.
(4) COBALT SOURCE CARS
80'
℄ TRACK CROSSING
COBALT SOURCE
150'
RADIATION


N
10'-0" LG. REMOVA
(4) ELECTRIC
AT 24' C.C.
DRAIN PIPE
SIGNAL & POWER CABLES
(UNDERGROUND)
8" DIA. DRAIN TILES
30" DRAIN PIPE
D
A
P&S
45'
SIGNAL & POWER CABLES
(UNDERGROUND)
SOURCE CAR TRACKS
TEST STA. No1

RADIATION RANGE WATCH CHECK LIST
12ND NRDL-714 (Rev. 6/66)

NAME AND RATE OF RANGE WATCH _____ DATE WATCH STARTED _____
EXPERIMENT RANGE INVESTIGATOR _____ TEL. NO. _____
ALTERNATE RANGE WATCH _____ TEL. NO. _____

1. Received keys, film badge, and NRDL-Camp Parks Facility Log Book at Bldg. 310.

_____ (Time)

2. Following items were checked at the indicated times:

		--> (initial)
(a)	Rotating red beacon lights operating at Gates 1, 2, 3, 8 and 10 and gates locked.	0600 _____
(b)	Red warning flags flying at Gate 1 and Control Center.	0900 _____
(c)	D.C. power system activated (white light on).	1200 _____
(d)	Control panel source lights on (red lights).	1500 _____
(e)	Air pressure system operative (green light on).	1800 _____
(f)	Tower and track red warning lights (4) in source area operative.	2000 _____
(g)	Radiation detection system reading normal. Reading: _____	2200 _____
(h)	Portable radiac reading normal. Reading: _____	2400 _____
(i)	Clock operating.	
(j)	Visual inspection of area with binoculars.	
(k)	Nonessential equipment turned off. Control Center locked prior to returning to Bldg. 310 _____	

3. NRDL Duty Officer notified of watch relief.

_____ (initial)

4. Army Security notified of watch relief.

_____ (initial)

5. At sunset, source area floodlights (4) and high radiation area fence lights turned on. Indicate number of fence lights burned out _____. _____ (time)

6. At sunrise, if source is visible, source area floodlights (4) and high radiation area fence lights turned off. _____ (time)

7. Radiation range turned over to relief. _____ (time)

8. If an unusual circumstance occurs, fill in the following:

(a) What happened? _____

_____

_____

(b) Source(s) was lowered. _____ (time)

(c) Visual inspection verifies source(s) housed. _____ (time)

(d) Radiation detection system reads zero. _____ (time)

(e) Portable radiac reads zero. _____ (time)

(f) Alternate Range Watch notified. _____ (time)

(g) Radiation Range Supervisor notified. _____ (time)

(h) Experiment Range Investigator notified. _____ (time)

(i) NRDL Duty Officer notified. _____ (time)

(j) Army Security notified. _____ (time)

(k) Experiment resumed, sources raised. _____ (time)

CAMP PARKS FACILITY
U. S. NAVAL RADIOLOGICAL DEFENSE LABORATORY
San Francisco, California 94135

PARKSFAC 1601.2A
170
27 July 1966

CAMP PARKS FACILITY INSTRUCTION 1601.2A

From: Camp Parks Representative
To: Distribution List

Subj: Camp Parks Radiation Range Watches

Ref: (a) NRDLINST 1601.3
(b) NRDLINST 5450.6
(c) PARKSFACINST 1601.1
(d) Nucleonics Range Watch Check list, 12ND NRDL-714 (Rev. 4/65)

Encl: (1) Radiation Range Watch Check List, 12ND NRDL-714 (Rev. 6/66)

1. Purpose. To redefine the duties and responsibility of the Camp Parks Radiation Range Watchstanders as a supplement to reference (a).

2. Cancellation. This Instruction supersedes and cancels PARKSFACINST 1601.2 of 18 Nov. 1964; same subject.

3. Background. Enclosure (5) of reference (a) established the Camp Parks Nucleonics Range Watch as a military security watch to be stood by enlisted personnel supplied from NRDL Headquarters in San Francisco. To supplement this watch, PARKSFACINST 1601.2 established the Alternate Range Operator Watch to be stood by enlisted personnel permanently stationed at Camp Parks. When it was necessary for NRDL Investigators to operate the range for a period of 8 hours or longer, a military range watch was established with the Alternate Range Operators assuming the watch from 0730 until 1600 on the working weekdays, while enlisted personnel from the Laboratory assumed the watch at all other times, i.e., 1600 to 0730 on working weekdays and for 24 hours on weekends and holidays. In addition, upon being relieved at 1600, the Alternate Range Operator was to assume a telephone watch at his place of residence so as to provide assistance to the Range Watch on duty at Camp Parks, should the need arise. All personnel assigned to the watch lists were required to have successfully completed a Rad Safe course of instruction in the operation of the range and the completion of the watch check list and, as a result, possess a valid operator's certificate.

4. Revision of Titles. Reference (b) renames the Camp Parks Nucleonics Range as the "Camp Parks Radiation Range." As a further extension of this, the Camp Parks Nucleonics Range Watch shall henceforth be referred to as the "Range Watch", the Alternate Range Operator shall be referred to as the "Alternate Range Watch" and the investigator in charge of the total experiment shall be referred to as the "Experiment Range Investigator."

Encl (1) to Supplement 4

5. Watchstander Instructions. The Range Watch and Alternate Range Watch will be established at the beginning of an experiment by the Experiment Range Investigator when the exposure time is to run for a period of 8 hours or longer. Personnel will continue to be assigned to watches in the manner prescribed in paragraph 3 above. The guidelines to be adhered to during the conduct of the watches are as follows:

a. Radiation Range Watch

(1) Watchstanders coming from the Laboratory for a working weekday watch should allow themselves sufficient travel time so as to arrive at Camp Parks by 1545. The weekend and holiday watches will commence at 0800 and watchstanders coming from the Laboratory for these watches should depart in sufficient time so as to arrive by 0745.

(2) Watchstanders will make appropriate entries in the Camp Parks Facility Log Book when operation of the Radiation Range has commenced and terminated, when the watch is relieved and when significant events occur. Specific instructions for filling out the Log are contained in reference (c).

(3) Watchstanders will remain in the Camp Parks area at all times except for the purpose of taking meals.

(4) Whenever watchstanders leave Camp Parks they will notify Army Security (828-2057) of their departure and return.

(5) The Radiation Range Watch Check List (enclosure (1)) will be filled out in full and turned into the Radiation Range Supervisor by 0730 on the morning following the watch. Enclosure (1) revises reference (d) with the new provision that the Radiation Range will be inspected 8 times (0600, 0900, 1200, 1500, 1800, 2000, 2200 and 2400) by both the weekday and weekend watches. Military personnel permanently stationed at Camp Parks will be responsible for the 0900, 1200 and 1500 working weekday inspections (normally the Alternate Range Watch for that day will be responsible for conducting the inspection). The Range Watch will be responsible for all other inspections. Enclosure (1) lists 11 items (paragraph 2) which will be checked on each routine inspection. Upon completion of the 2400 inspection, the Range Watch may secure to Building 310 for the night.

(6) Each Range Watchstander will become familiar with the operation of the auxiliary generator and the process of converting from main to auxiliary power. In the event of a power failure, the first duty of the watch is to convert to auxiliary power. In order to ensure that each watchstander is capable of starting the generator and converting to auxiliary power, it shall be the responsibility of each man who is on the Radiation Range Watch List for a given month to actually start the generator and perform the conversion at least once during that month. It is intended that this obligation will be fulfilled during an actual watch period when the range is in operation; however, it may be fulfilled at the convenience of the watchstander, providing prior arrangements are made with the Radiation Range Supervisor. Evidence of such fact shall be entered in the Camp Parks Facility Log Book.

(7) In the event of a fire, the watchstander will first notify the Fire Department (828-3817) and then those persons listed in order in the chain of command given below. In the event that unauthorized personnel are discovered within NRDL premises, Army Security (828-2057) will be notified first and then those persons listed in order in the chain of command. In all other instances, the chain of command to be used for reporting an unusual circumstance is as follows:

(a). Alternate Range Watch.

(b). Radiation Range Supervisor.

(c). Experiment Range Investigator.

(d). NRDL Duty Officer.

(8) Of primary concern to the Range Watch shall be the security of both the Radiation Range and NRDL premises surrounding Building 310. (NRDL premises are specifically defined by the perimeter fences shown on NRDL Drawing No. S-65-1091 of 27 July 1965). All gates shall be secured by 1600 with the exception of Gate #4 which may be left open until the final inspection of the Radiation Range is made at 2400.

(9) In the event of an emergency on the Radiation Range, the steps to be followed are listed in enclosure (1), paragraph 8. If the sources are lowered for any reason, they will not be raised again without the permission of the Radiation Range Supervisor.

b. Alternate Range Watch

(1). The primary duty of the Alternate Range Watch is to assist the Range Watch between 1600 and 0730 when unusual circumstances occur which he is incapable of handling. In addition, the Alternate Range Watchstander for a given day assumes the duties of the Range Watch for the portion of the working weekday between 0730 and 1600 and, accordingly, must be guided during this time by those instructions listed in paragraph 5a above.

(2). The Alternate Range Watch is responsible for inspecting the Radiation Range at 0900, 1200 and 1500 and for making the appropriate entry on the Radiation Range Watch Check List. This check list will be turned over to the Laboratory Range Watch upon his arrival at 1600 and shall be utilized until the new watch period starts at 0730 the following morning.

(3). After 1600, the Alternate Range Watch will assume a telephone watch normally stood at his place of residence. However, his movements are not restricted so long as he remains within telephone contact of the Range Watch at Camp Parks.

(4). The Alternate Range Watch is authorized to make such random inspections of the range and the NRDL premises as may be warranted. In the event that the Alternate Range Watch is informed by the Range Watch of an emergency, he shall proceed to Camp Parks, take charge and initiate such action as he deems necessary until relieved by competent authority.

6. Watch Lists. Watch Lists for the Range Watch will be prepared in accordance with reference (a). Watch lists for the Alternate Range Watch will be prepared by the Administrative Assistant (Code 170A) and submitted to the Radiation Range Supervisor for approval.

M. A. CHASE

Distribution:
Distribution List A
Duty Watch Room
NRDL Duty Officer

U. S. NAVAL RADIOLOGICAL DEFENSE LABORATORY
San Francisco, California 94135

NRDL 1601.3 CH-2
200
24 February 1967

NRDL INSTRUCTION 1601.3 CHANGE TRANSMITTAL 2

From: Commanding Officer and Director
To: Distribution List H

Subj: Enlisted Watches

Encl: (1) Change sheet for subject Instruction

1. Purpose. To forward enclosure (1) which updates enclosure (5) of subject Instruction.

2. Action. Addressees will insert enclosure (1) of this Change Transmittal in subject Instruction and remove the sheet bearing the corresponding page numbers.

3. Cancellation. This Change Transmittal is cancelled when prescribed action has been taken.

D. C. CAMPBELL

INSTRUCTIONS FOR THE CAMP PARKS RADIATION RANGE WATCH

1. Purpose. To provide surveillance of the Camp Parks Radiation Range by a qualified range operator (as certified by the Radioisotope Committee) when the range is in operation outside of normal working hours.

2. Duty Post. The duty posts for this watch are the Radiation Range Control Center and the Duty Watch Room in Building 310.

3. Hours of Watch.

a. Working Weekday Watch. Watchstanders shall depart the Laboratory at about 1430 for Camp Parks and assume the duty at 1600 until relieved the following morning by Camp Parks military personnel at 0730.

b. Weekend and Holiday Watch. Watchstanders shall depart the Laboratory at about 0645 for Camp Parks and assume the duty at 0800 until relieved the following morning at 0800 (on working weekdays, Camp Parks military personnel will assume the watch at 0730 vice 0800).

4. Responsibilities. The responsibilities of the Range Watch and the procedures to be followed with regard to filling out the Radiation Range Watch Check List, 12ND NRDL-714 (Rev 6/66) are contained in PARKSFACINST 1601.2A of 27 July 1966. All watchstanders should be familiar with this Instruction before assuming the watch.

5. Procedures.

a. Working weekday watchstanders will draw a set of linen from Laundry, Room 286, Building 815 between 0730 and 0830. Weekend and holiday watchstanders will pick up linen on the previous working weekday. Watchstanders will sleep in the Duty Room on the second deck of Building 310.

b. Personnel subsisting in the general mess may call the Mess Hall, Ext. 8-2827, and request that a box lunch be prepared for pickup later in the day when they stand a working weekday watch. Arrangements should be made with the Mess Hall a day in advance when standing a weekend or holiday watch.

c. Draw a vehicle from the Transportation Office (Code 255), pick up the box lunch, if applicable, and proceed to Camp Parks.

d. Upon arrival at Camp Parks, report to Building 310. Obtain custody of the range keys, film badge and Form 12ND NRDL-714 (Rev 6/66). Make an appropriate entry in the Camp Parks Facility Log Book acknowledging receipt of the aforementioned items and that the watch has been relieved. Take note of any special instructions left by the Camp Parks Representative or the previous watchstander.

e. The Radiation Range Check List, 12ND NRDL-714 (Rev 6/66) is to be completed and turned into the Camp Parks Representative by 0730 the following morning. Watchstanders having duty on Sundays will collect the completed Radiation Range Watch Check Lists for Friday and Saturday and turn them in with the Sunday check list at 0730 Monday morning.

U. S. NAVAL RADIOLOGICAL DEFENSE LABORATORY
San Francisco, California 94135

NRDL 5450.6
170
9 June 1966
ch 1 - 17 Mar 67

NRDL INSTRUCTION 5450.6

From: Commanding Officer and Director
To: Distribution List C

Subj: Camp Parks Radiation Range; operation and maintenance of

Ref: (a) Range Operator Instruction Sheet for the Camp Parks Radiation Range
(b) Rad Safe Aspects of the Camp Parks Radiation Range (Rev 6/66)
(c) Engineering Maintenance Manual, Radiation Range, Camp Parks

1. Purpose. To redefine responsibilities and prescribe procedures for operation and maintenance of the Camp Parks Radiation Range.

2. Background. In the past, responsibility for operation and maintenance of the Radiation Range was shared by three Laboratory codes. The Scientific Staff Assistant (Code 940A) was designated Range Supervisor with responsibility for scheduling and overall control of the Range. The Technical and Administrative Services Director (Code 200) was responsible for the maintenance of the Range, while the Camp Parks Representative (Code 170) was responsible for local security measures and adjustment of the Range schedule to conform with the overall Camp Parks' operation. However, Range use has sufficiently increased to the point where a single resident Radiation Range Supervisor with overall responsibility would be more practical, considering present NRDL requirements.

3. Revision of Range Title. The Cobalt 60 radiation source at Camp Parks, formerly referred to as the Camp Parks Nucleonics Range, shall henceforth be referred to as the "Camp Parks Radiation Range".

4. Responsibility and Control.

a. Radiation Range Supervisor. Code 170 is hereby designated as Radiation Range Supervisor and shall be responsible for all aspects of the operation and maintenance of the Camp Parks Radiation Range, up to the point of actual use of the Range by qualified operators and scientific investigators.

b. Access. Code 170, or his designated administrative assistant, shall be responsible for issuance of keys for the Radiation Range to qualified personnel only, including designated maintenance and support groups.

c. Records of Use. Completed operator and watch check lists will be maintained by Code 170 as a permanent record of Range use.

d. Scheduling. The scheduling function will be performed by the Camp Parks Radiation Range Scheduling Committee, which will consist of representatives of user codes and the Radiation Range Supervisor.

Chairmanship of the Committee will rotate semiannually between representatives of the Radiation Physics (Code 170) and Bio-Medical Sciences (Code 920) Divisions. Code 170 shall be kept fully informed by the Committee Chairman of the scheduled use of the Range and shall adjust the schedule with the concurrence of the Chairman, if circumstances require it.

e. Radiological Safety. The Health Physics Division (Code 730) will be responsible for all operational aspects of radiological safety at the Radiation Range, and will work closely with Code 170 when modifications and improvements are anticipated.

f. Modifications. Modifications and alterations to the Radiation Range shall be accomplished only after the concurrence of Code 170, the Radiation Range Scheduling Committee, Code 200, and Code 730.

5. Radiation Range Operator Training. Code 730 shall be responsible for the training of Laboratory personnel in both the operating procedures, as listed in reference (a), and safety features, as listed in reference (b), and of the Radiation Range. A training program comprising classroom instruction, on-site training and a qualifying examination shall be administered as necessary to ensure that an adequate number of qualified operators are available. Upon successful completion of the course, the person becomes authorized to operate the facility and a certificate to this effect, subject to renewal semiannually, shall be issued under authority of the Radioisotope Committee. The list of duly qualified operators shall be revised semiannually by the Radioisotope Committee.

6. Maintenance. Maintenance of the Radiation Range shall be performed in accordance with reference (c). Maintenance periods shall be scheduled by the Scheduling Committee. Emergency problems arising will be assigned top priority. Any defect in the Radiation Range discovered by Radiation Range operators and scientific investigators shall be immediately reported to Code 170. Code 170 shall be informed of any work on the Radiation Range, in addition to receiving copies of all drawings, plans and specifications which may affect the Range.

7. Action. Code 170 shall initiate such additional implementing provisions and instructions as may be required for the proper operation of the Camp Parks Radiation Range. Cognizant Laboratory codes shall take steps to ensure that all Instructions, manuals and publications concerning the Camp Parks Radiation Range are reviewed and brought up to date on a semiannual basis.

D. C. CAMPBELL

RANGE OPERATOR INSTRUCTION SHEET FOR THE CAMP PARKS NUCLEONICS RANGE

I. Area Security

The area is secured by two fences, the outer perimeter "RESTRICTED AREA" fence and the inner perimeter "HIGH RADIATION AREA" fence. For five-source operation the maximum radiation intensity at the outer fence is 10 mr/hr and at the inner fence is 100 mr/hr. The outer fence has nine gates (numbered sequentially as shown on the attached map), four of which are on access roads (Nos. 1, 2, 3 and 8). All nine gates must be closed and locked prior to source operation. These gates permit authorized entry of livestock and/or vehicles to the area. The four road access gates must, in addition, be equipped with flashing road markers which are activated when the source is operating. The inner fence, likewise has three gates (Nos. 10, 11 and 12) that must be closed and locked prior to source operation. An exception to the closing and locking of any inner gate may be made only for short-term exposures of less than 30 minutes and only when continuous visual surveillance is maintained of that gate.

"CAUTION-RADIATION AREA" signs must be displayed at 100-foot intervals along the outer fence and "DANGER-HIGH RADIATION AREA" signs must be displayed at 50-foot intervals on the inner fence. The red warning flag, located on the pole near the door to the Control Center and at Gate #1, will be raised whenever the source is open.

Gate 2 near the Control Center should be kept locked at all times. Range operators will have the authority to refuse admittance to all radiation areas. Persons occupying the Control Center will wear film badges at all times. All visitors must check in with the Range Operator upon arrival.

II. Visual Survey of the Area

A. All inner perimeter gates (Nos. 10, 11 and 12) must be locked and the area between the inner perimeter fence and the outer perimeter fence must be toured by the Range Operator.

B. The area to the north of the source site is most easily accessible through the north gate (#11), with side detours to inspect the north portion of the range.

C. The area to the south of the source site is most easily accessible through the south gate (#12). The road leading south may be followed to the outer perimeter fence gate (#8). The operator should proceed to Gate 1, using the roads outside the south fence, inspecting the southern portion of the area. (NOTE: Road flashers are located at Gates 8 and 1.)

D. Security survey of the area on the west side of the site may be made by following the road leading from Gate 1 to the Control Center.

E. A visual survey of the northwest portion of the range can be made from the Control Center.

III. Nighttime Operation

Each sign on the inner perimeter fence must be illuminated when the facility is operated at night. Light switches are located in the Control Center and the range operator should look out at the range to be sure all lights are ON.

IV. Use of Personnel Dosimeters

The entire area to the extent of the outer perimeter fence is a radiation area and all persons in this area will wear film badges and pocket dosimeters issued in Bldg. 310.

V. Use of the Operating Log Book

The operating log book is a record of the time of source operation. Operators will record the time the sources are in operation and any other pertinent information, such as visitors, weather conditions and malfunctions.

VI. Safety Devices

A. Warning Lights

Blinking red lights to give warning of source operation are located on the tower, at test station No. 1 (three lights) and at Gates 10 and 12. The gate lights and two of the three test station lights are operated by the radiation detection system; the tower light and the third test station light are operated by mechanical switches when either the tower source is raised from its container or the air pressure is applied to raise the track sources.

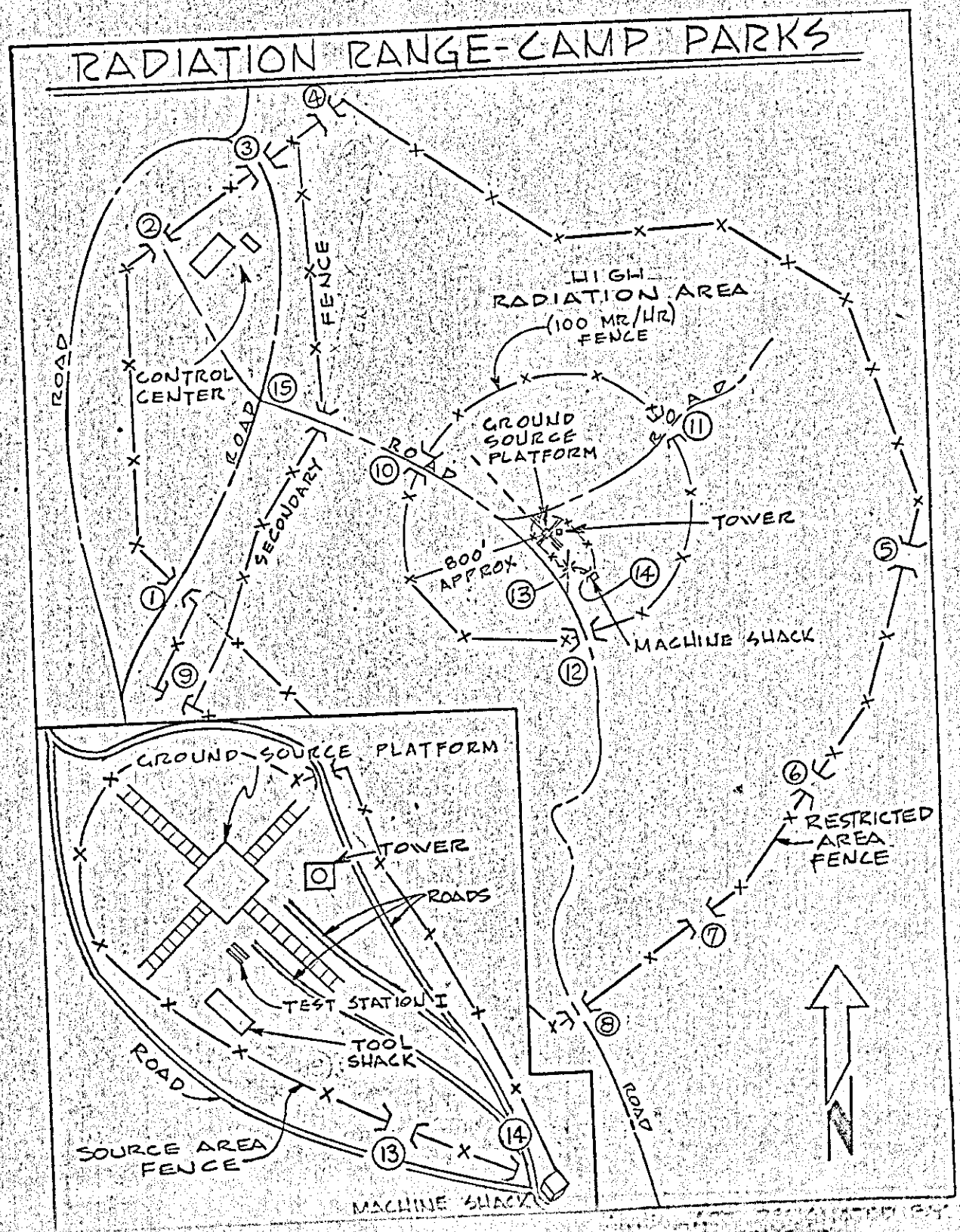
B. Control Panel Lights

a. The green light on the panel indicates that the air pressure is sufficient for track source operation. In order that the air pressure will be maintained for continuing operation, the pressure cut-out switch on the compressor in the machinery house must be pushed to the ON position.

b. The white light on the panel indicates that the D.C. power is on.

c. The yellow light on the panel indicates that the flood lights in the source area are on.

RADIATION RANGE-CAMP PARKS



d. The red light by each source switch on the panel indicates when that source is in the exposed position. These lights are operated by microswitches on the source containers.

e. The blinking red light on the panel is operated by the radiation detection system.

C. The Horn Warning System

The facility is equipped with an audible warning device consisting of 2 Klaxon horns located on top of the machinery shed. These Klaxon horns are activated for 4 seconds when the tower track sources are being raised and the power circuit is in series with a key switch located on the control panel in the machinery shed.

D. The Radiation Detection System

The radiation detection system consists of 3 AN/PDR-43's permanently mounted inside test station number one. The first detector operates the top meter read-out on the control panel. A half-scale indication will correspond to a radiation level of 50 r/hr at the detector for a normal setting on the middle range. The readings on the high half of the scale will be nonlinear, and the meter will stay on scale for any radiation level. This detector also operates one of the test station one lights. Detector No. 2 operates a test station No. 1 light, the lower panel meter readout and blinking light and the buzzer which sounds when a track source is lowered. Detector No. 3 operates a test station No. 1 light and the lights and buzzers at gates 10 and 12.

E. The Buzzer Warning System

When a track source is lowered a buzzer in the control center is started by release of air pressure in the machinery house. The buzzer will continue to sound until the radiation level in the source area lowers.

VII. Track Source Operation

The four track sources are located on cross tracks 120' x 200' and are movable along the tracks. Wheel locks are provided in the center of each of the track sources and the cars may be moved a precise distance from the center point by locating the marker arm over the desired distance on the measurement tape. Four track tapes are calibrated to show the exact distance from the center of the track intersection.

To activate the track sources the operator must unlock the security chain, remove the lead collars and connect the air hoses, control cables and grounding cables. The air hoses are marked with red and yellow color codes and are connected to the matching colors on the air supply lines located alongside the tracks. The ground cables are connected to the air supply line. These ground cables provide a circuit that may be completed if the necessity arises to use the explosive bolt capability. The power switch SV1 located in the auxiliary panel in the machinery shed must be turned to the ON position to activate these sources.

VIII. Tower Source Operation

The tower source is prepared for operation by removing the security chain and cable restrainer and turning on the power switch that is located in the machinery shed.

The tower source has two speeds in the up and down directions. The key-operated remote control selector switch may be activated at the Control Center or at the machinery shed (normally not operated at the machinery shed).

Limit switches are provided to automatically stop the winch motor when the source is at the top of the tower at a distance of 75 feet from the base. The limit switches are activated by switch triggers that are clamped to the cable. These switches are located (1) at the top of the tower, and (2) at the end of the cable run in the V-shaped track.

The limit switch at the top of the tower is coupled electrically by a cable to the power box at the base of the tower. It is important to be sure that the plug is secure in the box at the base of the tower or the tower source cannot be returned when it is raised out of the container.

A manually operated winch release to return the tower source to the container is located in the machinery shed and can be used by disconnecting the clutch, coupling the cable drum to the electric brakes and motor, and simultaneously applying the pressure to the rim of the cable drum.

A concrete shield is located between the machinery shed and the source. The purpose of this shield is to reduce the radiation exposure to personnel who operate the facility from the machinery shed.

RANGE OPERATOR CHECK LIST (CAMP PARKS NUCLEONICS RANGE)
12ND NRDL 810 (Rev 9/65)

Signature of Range Operator	Date

PREPARATION OF RANGE FOR OPERATION	✓
1. Inform Camp Parks Representative (Code 170) or his alternate of intended use of the range.	
2. Ensure that all persons who will enter the restricted area have film badges and dosimeters. (Available in Bldg. 310)	
3. Close and lock outer fence gates (Gates 1, 2, 3 and 8) and retain keys.	
4. Be sure that RADIATION signs are displayed on outer and inner fences. (For unattended operations, additional signs "Radiation Source is in Operation - KEEP OUT" will be displayed on Gates 1, 3 and 8.)	
5. Check the restricted area to be sure it is clear of unbadged persons and unauthorized animals.	
6. Be sure road flashers are operating at Gates 1, 2, 3 and 8.	
7. Close and lock inner fence gates and retain keys.	
8. Turn on sign lights and be sure all are operating (at night).	
9. Go to the Control Center and take action as follows:	
a. Activate the A.C. and D.C. power systems.	
b. Check the radiation detection system; confirm zero reading and that the Gate 10 light is OFF.	
c. Inspect each source with the telescope; confirm that each is shielded.	
10. Go to the Machinery Shed, and:	
a. (Enroute, take the low range survey meter, turned ON, and confirm it registers zero.)	
b. Deactivate air compressor (SV1) circuit.	
c. Inspect machinery - compressor tank, belt drives, air connections, etc.	
d. Be sure that reset switch located at top of the compressor is ON.	
11. If the Tower Source will be used:	
a. Remove source cover and store in equipment shed.	
b. Check clearance of the cable from the tower.	
c. Check clearance of the source plug in its container. (The plug must not bind at any point.)	
d. Check the lower limit switch and its connection.	
e. Check the adjustable cable stop at each end of the cable trough.	
f. Inspect spring-loaded track guides.	
12. If Track Sources will be used:	
a. Remove source covers and store in equipment shed.	
b. Position sources for use. (If the sources are at track intersection, use the source positioning "jig".)	

PREPARATION OF RANGE FOR OPERATION - Track Sources (contd)	✓
c. Check source arm movement path for interference.	
d. Ensure that the nut on the cam roller is in place.	
e. Check the condition and alignment of the dust shield.	
f. Open the emergency air valve under the cart by one and a half turns from the closed position.	
g. Hook up electrical ground cables to air supply pipes.	
h. Hook up appropriate air hoses. Hook up control cables. (Air hoses have been checked for secure connections.)	
i. Remove all loose items (including lead collars) from tops of source containers and place in equipment shed.	
13. Go to Machinery Shed and reactivate air power (SV1) circuit. (Watch the source area for source movement and the survey instrument for radiation levels during this operation.)	
14. Return to Control Center; lock all gates and retain keys. (Exception: Gate 10 may be left open if run is short and gate is watched continuously.)	

SOURCE OPERATION	✓
1. Raise red warning flags at Control Center and at Gate No. 1.	
2. Make final check of the restricted area and account for all personnel.	
3. Notify Camp Parks Representative (Code 170) of time of source raising and planned extent of use. For 24-hour operation also notify Camp Parks Fire Station. (Telephone: Camp Parks Representative, 828-2294)	
4. Use key to activate source raising machanism. Make sure warning horn has sounded.	
5. Look through telescope to be sure sources are exposed.	
6. Be sure a positive reading and red light on radiation detection meter confirms system functioning.	
7. Take reading of radiation level in the Control Center with portable instrument; enter reading in the log.	
8. Be sure the red warning lights on the tower and at test station #1 are ON.	
9. Be sure the warning light at Gate 10 is ON.	
10. Be sure that the red and white lights on the control panel are ON.	
11. Record the source raising time in the log book.	

RE-ENTRY INSTRUCTIONS	(Check appropriate block for each re-entry.)																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1. Use key to lower source.																			
2. Check to be sure sources are housed. **																			
3. Be sure radiation detection system reads zero and red meter light is out.																			
4. Buzzer in Control Center is silent.																			
5. The portable radiac indicates zero reading.																			
6. Be sure the red warning lights in the source area are OFF.																			
7. The red panel light is OFF.																			
8. Record in log book time source was lowered.																			
9. Enter source area with survey meter turned ON.																			
10. At Gate 10 light must be OFF and buzzer silent.																			

**Notify Range Supervisor immediately if source cannot be housed.)

RANGE SHUTDOWN	✓
1. In machinery house, deactivate track source circuit.	
2. Lock all sources. (Replace lead collars before extended shutdown.)	
3. Remove air hoses and store in equipment shed. Disconnect control cables.	
4. Cover sources.	
5. Turn off flashing road marker lights on Gates 1, 2, 3 and 8.	
6. Deactivate A.C. and D.C. power supplies.	
7. Notify Camp Parks Representative and Base Security that range is secured.	
8. Lower red warning flags.	
9. Leave all range gates locked.	
10. Turn in check sheets, log book and range keys to Range Supervisor. (Room 405 at NRDL)	

EMERGENCY PROCEDURES
FOR
CAMP PARKS RADIATION RANGE

All personnel using the Camp Parks Radiation Range are required to read and be familiar with the following procedures:

A. Notification

In all events of an accidental or non-routine nature the following personnel should be immediately contacted by phone:

(1) Radiation Range Supervisor - Camp Parks, 828-3620
(2) Health Physics Division - MI 8-6900, Ext. 240
(3) Engineering Division - MI 8-6900, Ext. 351

B. Tower Source Hang-Up

In the event of the Tower Source failure to return to the shielding container:

(1) Maintain area surveillance until arrival of health physicist and Radiation Range Supervisor.
(2) Enter machinery shed, approaching from southeast perimeter, preceded by health physicist who will determine radiation levels.
(3) Apply hand brake to winch and release motor drive coupling.
(4) Gradually release brake pressure to allow source to return to container.

C. Track Source Hang-Up

In the event of a Track Source failure to return to the shielding container:

(1) Apply emergency "down" air pressure at the control panel.
(2) If this does not work, maintain area surveillance and call the personnel listed under (A).
(3) Further action will be taken by Engineering and Health Physics personnel as required to return the source to a shielded position.

1. Cart Source Movement and Set Up

The cart sources may be moved to positions at the end of one of the long tracks, at the end of the short cross tracks, or any intermediate positions on any segment of the track array. The turntable is used by rolling the cart into place, locking the cart brake, and rotating the turntable to transfer the cart to the new position. Electrical cables and ground cables should be kept clear of the cart wheels.

Air pressure transfer hoses (stored in the tool shed adjacent to the cross tracks) are connected to the cart sources and to the air taps on the air supply lines that run parallel to the tracks. In that the slip connectors on the end of the air hoses are lubricated with a light grease, care should be taken to avoid dragging the hoses through the dirt.

The electrical cable connectors terminate in the junction boxes adjacent to the tracks. The ground cables that are used to provide electrical continuity between the carts and the air pipe, are fastened to the two parts of an electrical circuit that is completed to provide operation of the explosive bolts holding the source to the source raising arm.

2. Use of the Source Jig

The source jig, a rectangular frame, is used to connect all four sources together or a pair of sources together at the center of the track crossing. The jig is numbered with numbers 1234 to indicate the proper

orientation of the jig with respect to the four sources. The proper distance for a four in line array, or a two in line array can be obtained with the jig. When the sources are to be operated in close proximity to each other, the jig is necessary to prevent interference in the source arm travel.

3. Operation of the Source Raising and Lowering System

The sources rise by air pressure delivered to an air oil tank located on each of the 4 carts. By turning the master key on the control panel, or at the secondary control panel operate air releases at the solenoid valves. The sources are raised by hydraulic rams, and rotated by cam action to a position 130 degrees from the original line of movement. In turning the individual key switches off the air pressure is released from the air oil tanks to the atmosphere. The sources then return to the containers by gravity. The source raising time is 20 to 25 seconds. The time required for the sources to close is 30 to 35 seconds. Turning the master key to the off position releases the air from the supply lines at the machinery shack.

4. Use of the Emergency Down Air Pressure

The emergency down air pressure buttons are located directly above the individual source rising keys. By depressing one of the down air pressure buttons air is delivered to the top of the source rising ram. The pressure is equivalent to the tank pressure to a first approximation.

If no pressure exists on the opposite side of the ram (hydraulic), then the source will be delivered directly to the shield. If there is a residual pressure on the opposite side of the ram (hydraulic) then the source can be returned to the shield by increasing the air pressure on the opposite side of the ram and thereby providing an overriding pressure. The maximum safe pressure is greater than 200 psig. The safety valve on the compressor is set about 200 psig.

5. The Purpose of the Safety Breaker SV-1

Inside of the secondary control center (machinery house) there is a panel located on the wall. This panel contains a breaker SV-1. By disabling, turning the switch to the off position, before entering the area, the rising of the source will be prevented at either of the control panels. This acts as a safety procedure to protect the operator or other personnel who enter and work in the source area when the range is in a standby condition.

6. The Secondary Control Center

A secondary control center is located in the machinery shack. This control center has most of the primary control switches and indicating lights. If the range is operated from the secondary control center then the operator must keep in mind that there will be some personnel exposure that is determined by the number of sources that are used, the length of the exposure time during the exposure that the operator stands out of the exposure shield should be watched with a stop watch and dosimeter.

7. Operation of the Tower Source

Although the tower source is seldom used for experimental purposes, the operator candidates are required to operate this source from the control centers. The tower source will move at a speed of 20 or 40 feet per minute. The items to be completed can be seen on the operators check off list.

8. Operation of the Radiation Detection System

Two modified AN/PDR-43D radiacmeters are used to convert the radiation signal to audible and visual signals. AN/PDR-43D radiacmeters located in the enclosure of test station 1 respond to the radiation field produced by the cobalt 60 sources in proximity. A modification to the radiacmeters incorporates the use of a relay that enables the operation of the rotating beacon lights and buzzer warning system. The AN/PDR-43D radiacmeters are provided with 3 ranges of 5, 50, and 500 roentgens per hour to measure the radiation intensity. In operatinn the scale is set at an intensity of 5 roentgens per hour. When the radiation intensity reaches a value of 100 milliroentgens per hour the internal relay closes and the rotating beacon lights and the buzzers are set into operation. A Klaxon horn momentarily sounds when the sources raise out of the containers.

9. Signs, Tags, and Markings

Two types of radiation warning signs are used to demark the radiation areas bounded by the two fences at the range. The low radiation area or 2 mr/hr area is marked with "Caution Radiation Area" signs. The high

radiation area or 100 mr/hr area is marked with "Danger High Radiation Area" signs. The source containers are marked with radiation propellers.

10. Survey of the Source Range Prior to Source Operation

The area may be best visually surveyed by proceeding through gate 11 to the northeast section of the range. The south end of the range is most easily surveyed by traveling over a road that turns to the left approximately 1/4 mile below the outer perimeter fence.

11. Lighting and Nightime Operations

Lights are provided over the signs and on the center portion of the source area. Illumination of the 100 mr/hr fence is required during after hours operation.

12. Unattended Operation

During an unattended operation, an alarm system will be activated by sounding horns on each floor and on the roof of building 310 at Camp Parks when any source goes up or down during a test run. This system is now installed and operating well. If the alarm sounds the operator or watch will deactivate the alarm by pushing a button at the alarm panel and drive at once to the control center of the range to determine the trouble and take corrective measures.

13. Strip Chart Recorder

The strip chart is now installed in the control panel (control center). The strip chart recorder will indicate if a change in the radiation level

There are two fire extinguishers located on the site. One is located in the control center and the other is located in the machinery house. The facility should be secured during storms and heavy downpours in that drainage is provided for minimal rainfall only.

17. Emergency Procedures

a. Notification: Code 170, Camp Parks; Code 240, NRDL (Engineering Division); Code 730, NRDL (Health Physics Division).

b. Power Failure

To use the emergency generator, disconnect the main power source from the facility. Leverposition to off, connect the emergency generator to the on position, lever position down.

c. Tower source hang up (due to power failure).

Enter the machinery shed through gate #12. Decouple the winch and use the hand brake to allow the source to lower slowly.

d. Cart source hang-up.

In the event of power failure the source should return by gravity to the container. In the event of hang-up due to obstruction or back pressure in the cylinder, use emergency return air. If this fails, notify above Codes and stand by to maintain watch over facility.

e. Recording of emergency actions.

All incidents of an unusual nature must be entered in the operator's log.

18. Range Maintenance and Daily Maintenance

The maintenance manual is a manual that is used by maintenance personnel to serve as a guide in the maintenance of the range. Therein a stepwise procedure for all necessary maintenance functions is given. All sources shall be covered during short close down of the radiation facility of one day or more. Before using any components of the facility, it should be cleaned as necessary and checked for any improper operation, defects, etc. Any defects shall be reported to the radiation facility supervisor. Daily maintenance includes the cleaning of the tool shack, control center, etc. as required so that the Facility is clean at all times.

19. The Range Operator Logs

Three logs are used when range operations are conducted. The range operator logs are a record of all source operation. Source locations, duration of the source run and other pertinent information is recorded. The duty watch log is to be filled out by the standby operators. The base commander's log, a military watch log is kept at building 510.

20. The Range Operator Examinations

The range operator examinations are given usually every six months to selected range operator candidates. These examinations deal with range safety and range operation.

21. Atomic Energy Commission Licensing and Regulations

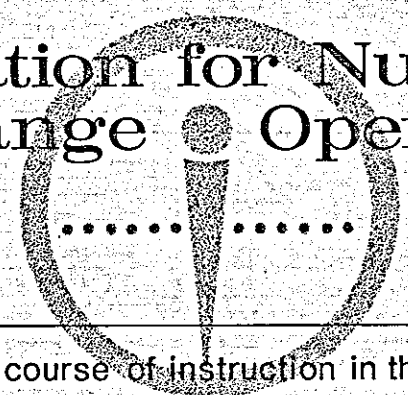
License to operate the range is provided by the USAEC and is

subject to renewal and review annually. Title 10CFR20, a regulatory statute are the regulations that must be complied with. The maximum exposure limits for personnel exposure is 5 (N-18), where N is the age of the individual in years 100 mr/week accumulated to 1250 mr/13 weeks is the recommended exposure rate. A maximum exposure of 3.0R in a 13 week period is allowed, provided that no exposure in excess of this is received. In the event of an emergency there will be a strict adherence to one or all of the regulations. In the event of a personnel exposure in excess of 3.0R a letter must be submitted to the AEC within 30 days of the date of the accident. This letter will be a concise narrative description of the events that occurred.

22. The Radiation Range Supervisor

The Radiation Range Supervisor (Code 170, Camp Parks) has overall responsibility for range operation. Range operators should report all operating problems to the Range Supervisor.

Certification for Nucleonics Range Operator



_____

has completed a course of instruction in the operation of the

U.S. NAVAL RADIOLOGICAL DEFENSE LABORATORY
COBALT ^{60} RADIATION FACILITY

at Camp Parks, California.

_____ _____
Range Supervisor Health Physicist

DATE OF ISSUE _____
SUBJECT TO RENEWAL WITHIN 6 MONTHS

RENEWED _____

RENEWED _____

RENEWED _____

SUPPLEMENT 5 (Item 15)

California Nuclear Incorporated
60 Industrial Row
Cowell, California

and/or

Nuclear Engineering Company, Inc.
64 Ray Street
Pleasanton, California